Achieving Universal Access to Electricity and Cleaner Cooking Fuels in Sub-Saharan Africa

A Stakeholder Influence Analysis of Energy Sector Development in Rwanda

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Summary

In the past decades the global development community has created numerous aspirations for 'the future we want', which has up to this day resulted into a focus on sustainable and renewable developments to increase our wellbeing while at the same time combatting climate change. A sector that gained high priority to fulfil these aspirations is the energy sector. While renewable energy strategies are increasingly implemented around the world, the primary goals for many countries in sub-Saharan Africa remain universal access to electricity and cleaner cooking alternatives. To support the countries, the involvement of non-state stakeholders and stakeholder partnerships has gained increased attention, especially after the establishment of the SDGs in 2015. However, it has been unclear what their influence means for energy sector development in these countries.

One of the countries lacking universal access to energy, but simultaneously going through a rapid economic development is Rwanda. Recent outcomes in energy policy development have attracted the arrival of multiple private sector investors and partnerships to support the distribution of decentralised energy systems, which led to a shift in sector donor support from mainly funding public institutions to an increased balance between public and private support. However, despite the rise of these stakeholders and stakeholder groups, it remains difficult to rapidly expand access to electricity and clean cooking alternatives. This research has therefore taken Rwanda as a suitable case to investigate the influence of the increased number of stakeholders in an economically emerging country with similar challenges as other sub-Saharan African countries.

The findings show that up to this day non-state stakeholders and partnerships have not been able to fill the gaps in sector development perceived by the Rwandan government and households. The main issues within the energy sector are threefold:

i. The low financial capacities of households in rural areas to afford decentralised energy systems
ii. The inferior value of decentralised energy systems compared to centralised energy systems
iii. Stringent financial mechanisms that lead to failure of private sector projects

The findings further suggest that non-state individual stakeholders operating in Rwanda have more influence on energy sector development than most partnerships. The main issue here is that partnerships are often physically absent from the country and struggle with internal interactions. Lastly, this thesis provides recommendations for governments, non-state individual stakeholders and partnerships to assure the growth of a thriving energy sector in Rwanda are more widely in sub-Saharan Africa.

Key words: Energy sector development, Decentralised energy systems, Multi-stakeholder partnerships, Stakeholder influence, Low-income countries

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Leiden, 2020

"We must ensure that the global market is embedded in broadly shared values and practices that reflect global social needs, and that all the world's people share the benefits of globalization"

- *Kofi Annan, former Secretary General to the UN*

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Abbreviations

BES	Biomass Energy Strategy
EARP	Energy Access Roll-out Program
ESSP	Energy Sector Strategy Program
ICS	Improved Cookstove
INGO	International Non-Governmental Organisation
IPP	Independent Power Producer
LPG	Liquefied Petroleum Gas
MDG	Millennium Development Goal
MinAgri	Ministry of Agriculture
MinEcoFin	Ministry of Finance and Economic Planning
MinInfra	Ministry of Infrastructure
MinAloc	Ministry of Local Government
MSP	Multi-Stakeholder Partnership
M&E	Monitoring and Evaluation
NEP	National Electrification Plan
NEP&NES	National Energy Policy and National Energy Strategy
NGO	Non-Governmental Organisation
PIHH	Phonetic Interviews among Households
REG	Rwanda Energy Group
RES	Rural Electrification Strategy
RURA	Rwanda Utilities Regulatory Authority
RWF	Rwandan Franc
SDG	Sustainable Development Goal
SE4All	Sustainable Energy for All
SHS	Solar Home System
SLS	Solar Lighting System
SSA	Sub-Sahara Africa
WSSD	World Summit on Sustainable Development

1. Introduction

In 2015, the members of the United Nations (UN) endorsed a new global development agenda: 'Transforming our world: the 2030 Agenda for Sustainable Development', or as it is more commonly called: The Sustainable Development Goals (SDGs). Its precursor, the Millennium Development Goals (MDGs), had a comparable set of aspirations to be reached within fifteen years and both emphasised the importance of partnerships (MDG 8 and SDG 17) as a supporting system for achieving the other goals. Now, SDG 17 'Partnerships for the Goals' focuses on the enlargement of the problem-solving role of inter alia governmental institutions, private sector, non-governmental organisations (NGOs) and international organisations, operating in public, private and multi-stakeholder partnerships and equalises their future responsibilities to national government entities (Scheyvens, Banks & Hughes, 2016). These groups of stakeholders, originating from often wealthy and sometimes poor countries, are now jointly responsible for the implementation of the global goals and thus for reaching all target groups described in all 17 SDGs with a total of 169 targets.

The position of individual stakeholders on the one hand and partnerships on the other hand is a topic that has been described in research over the past few decades. The 1980s the classification of stakeholder salience by Mitchell, Agle and Wood (1997) into those with 'power', 'legitimacy', or 'urgency' has formed the baseline for stakeholder theory. Years later, their theory was transformed by Ruggerio, Onkila and Kuittinen (2014) into a design for measuring individual stakeholder influence, to determine the roles and amount of influence specific stakeholders have on governmental projects and policies. Their matrix can also be applied to partnerships– both public/private or multi-stakeholder - but since their influence is aligned to organisational success, the latter has to be researched first. According to the conditions of success described by Pattberg & Widerberg (2015), partnerships can only have a problem-solving influence when they adhere to the conditions for success that require sufficient actors, processes and contexts.

The position of stakeholders and partnerships has become more prominent in the SDG-era, however, empirical research regarding their influence in target countries has remained limited. In this research a specific SDG-theme, energy, has been chosen. Energy development is strongly linked to the SDGs because of the inherent struggles reviving around the topic and because of the high potential for stakeholders and partnerships in the sector. Over the years, global actors have put substantial efforts into the electrification and cooking modernisation in especially developing countries in the Global South. Within the current set of SDGs, these efforts have led to the establishment of SDG 7: 'Ensure access to affordable, reliable, sustainable and modern energy for all'. SDG 7 is composed of three targets which focus on access, the share of renewables and energy efficiency (UN, 2015). Although the number of people with access to electricity has doubled between 2000-2013 and 2014-2018, access to electricity in Sub-Saharan Africa (SSA) is still the lowest in the world (IEA, 2019). On the one hand, this means that many challenges still persist in countries with low access rates, however, it also means there are many opportunities for stakeholders and partnerships.

To make this empirical research tangible and more country specific, Rwanda is used as a case study. Rwanda is a low-income country in SSA and has set ambitious goals to reach universal access to electricity by 2024 and the usage of 100% clean fuels by 2030. It has the ambition to eliminate dependence on development aid and increase trade through private sector development, which would create many new opportunities for investors and donors in the Rwandan energy sector and hence for stakeholders and partnerships. Rwanda aspires to become a competitive leader in the region and on the whole continent and wants to become the 'Singapore of Africa'. After the Genocide in 1994, electricity access rates dropped to nearly zero percent and have since risen to 52 percent. However, to reach 100 percent by 2024, the other half, the most difficult half, still has to be reached. Contrary to the high electrification rates, access to improved cookstoves (ICS) and the reduction of biomass in the country is still low, whereas 98 percent of the country used biomass for cooking in 2018 (Ministry of Infrastructure, 2018).

It is important to understand how the Rwandan government tries to reach its electricity targets by 2024 and the entire SDG 7 by 2030 when the numbers in biomass usage should be reduced to zero percent. What policies are developed by the Rwandan government, and do they align to SDG 7? What is the role and influence of stakeholders and partnerships in this? How do the target groups, the consumers in Rwanda, perceive these policies 'on the ground' and the involvement of non-governmental stakeholder (groups)? And most importantly: Are they able to fill the current energy access-gap? To investigate how energy development is materialised in Rwanda, a low-income country with high ambitions, the following research question has been formulated:

What is the energy development situation in Rwanda and how do individual stakeholders and partnerships influence these developments in line with the 2030 targets mentioned in SDG 7?

This question is answered by the following sub-questions:

- *What policies has the Rwandan government developed to reach universal access to affordable, reliable, sustainable and modern energy?*
- *What is the perception of the Rwandan population regarding the implementation/materialisation of energy policies on a household level?*
- *What is the influence of individual stakeholders in the development of the energy sector in Rwanda?*
- *What is the influence of partnerships on energy development in Rwanda?*

The aim of this research is to investigate the role of individual stakeholders on the one hand, which can be governmental institutions, international organisations, private sector actors, NGOs, civil society actors and consumers and partnerships on the other hand in the development of the energy sector in low-income and low-access countries. This study aims to discover if and what supporting stakeholders contribute to the sector and if they are successful in filling the access-gap. This will be done by using the stakeholder influence matrix developed by Ruggerio, Onkila and Kuittinen (2014), and the conditions for success requirements used by

Pattberg and Widerberg (2015). Consumer groups and government policy will be researched by analysing both primary and secondary data sources and all research is supported by literature in global governance, stakeholder and partnerships theory, and energy development theory in SSA.

First, Rwandan energy policies are investigated by executing an historiographical analysis going back to the beginning of the millennium up until 2020. Chapter 5 will create an understanding of the way energy policies were developed over the years, what fundamental changes and small adjustments were made, and why this was done. It forms the baseline for the three chapters to follow, as the changes in policies over the years puts the perception and opinion of Rwandan consumers of energy developments in an understandable context. Moreover, it forms a background for stakeholder and partnership involvement in the past decades and what this involvement is going to be in the future.

The second sub-question addresses the perception of end-user stakeholders, consumers, regarding the development of the energy sector. The target group for energy development is the consumer group, in this research specified as households. Although this group is regarded as a stakeholder, involvement of non-end-user stakeholders on the one hand, and end-user stakeholders on the other hand are different in its core and the individual investigation of the end-user group's perception is essential in understanding development trends on the ground. To discover their perception, primary data is collected and analysed by conducting semi-structured interviews and surveys. Chapter 6 examines how the trends in energy policy developments are perceived by households and what they think are the most essential opportunities and challenges for reaching all the government's targets by 2030.

The third and fourth sub-question research the influence of non-end-user stakeholders in chapter 7, and partnerships in chapter 8. The stakeholder influence matrix and partnerships conditions for success table are used to discover their influence, whether differences exist between their influence on the energy sector and how they do this. These two sub-questions also address stakeholders' and partnerships' ability to fill the gap between policies and perceptions and what this means for future stakeholders and partnerships in Rwanda and more broadly in the Global South. As will become clear, both are able to fill the gap as long as there is sufficient funding, technical knowledge and more importantly: when the actors are present in the field instead of working from a remote office.

1.1 Scientific relevance

At the moment, the amount of research on the implementation phase of energy policies in line with SDG 7 is scarce, especially in the Global South. On top of that, the position of stakeholders and partnerships has been perceived as crucial by the UN during the development of both the MDGs and SDGs, but it remains unclear what their specific influence on policies in target countries is. It is therefore also unclear whether the prominent position of stakeholders and partnerships - that often have a Western heritage - within the UN framework of global governance influence policy implementation on the ground positively, negatively, or both.

Empirical research in countries where goals like SDG 7 are behind is essential. It is therefore necessary to contribute to this field of research with the results deriving from this thesis. Understanding how energy policies - in line with SDG 7 - are implemented in Rwanda and how this interacts with stakeholders and partnerships, is important. This case can create a baseline for future research in other developing countries, especially in SSA.

1.2 Societal relevance

Access to energy, aligned with the generation of renewable energy and the creation of more energy efficient techniques, remains low in developing countries. Besides this challenge, the share of renewable energy and energy efficient technologies has to increase as well to achieve SDG 7. This makes the task for many developing countries even more difficult. However, the way these countries deal with increasing requirements to energy development while also having to deal with an increased number of stakeholders with individual demands on the ground needs to be understood in order to assess whether ambitious energy targets are realistic to reach. On top of that, the introduction of renewable energy sources come with modern – and thus expensive – techniques of which it can be questioned if they suit the social situation of many poor inhabitants that have to be rapidly connected to an energy source. The outcomes of this research can clarify these challenges and can be applied in other developing countries, especially in SSA countries that face similar economic and social challenges.

2. Theoretical framework

In this section, the necessary concepts for this thesis are described. First, the trends in energy development in the Global South, or more specifically SSA, over the years are described, which implies the increasing involvement of especially private actors, but also NGOs and development organisations. Second, this chapter examines stakeholder and partnerships theory discussed in literature, by describing the history briefly and by discussing current debates in literature. Lastly, the SDGs in a global governance context are lined out, linking the global character of the goals to their prioritisation of increased stakeholder and partnership involvement in supporting energy development in target countries; in this case low-income SSA countries. All concepts contribute to the research framework and help answering all above stated research questions. The final section summarises the gap in knowledge between these concepts that forms the basis for this research.

2.1 Energy Development in Sub-Saharan Africa

Increasing access to energy and improving reliability and affordability is hampering in SSA compared to other areas in the Global South. Looking at figure 1, it is clear that the majority of people living without access to electricity lives in SSA. Out of the 20 countries with least access to electricity, 19 are located in SSA. Even though the number of people with access to electricity has doubled in 2014-2018 compared to 2000-2013, access to electricity in SSA is still the lowest in the world (IEA, 2019). Progress in the field of access to clean energy for cooking is even slower and is also the most pressing problem in SSA, which can be seen in figure 2. Despite the fact that many countries in East and South East Asia also still lack access to clean fuels and technologies, the 'yellow-coloured' countries are overly represented in SSA. A major cause for this is that in SSA high population growth is outpacing the efforts to provide basic access to clean cooking alternatives (IEA, 2019). These alternatives are cooking on gas, electricity, and efficient biomass alternatives like briquettes and pellets.

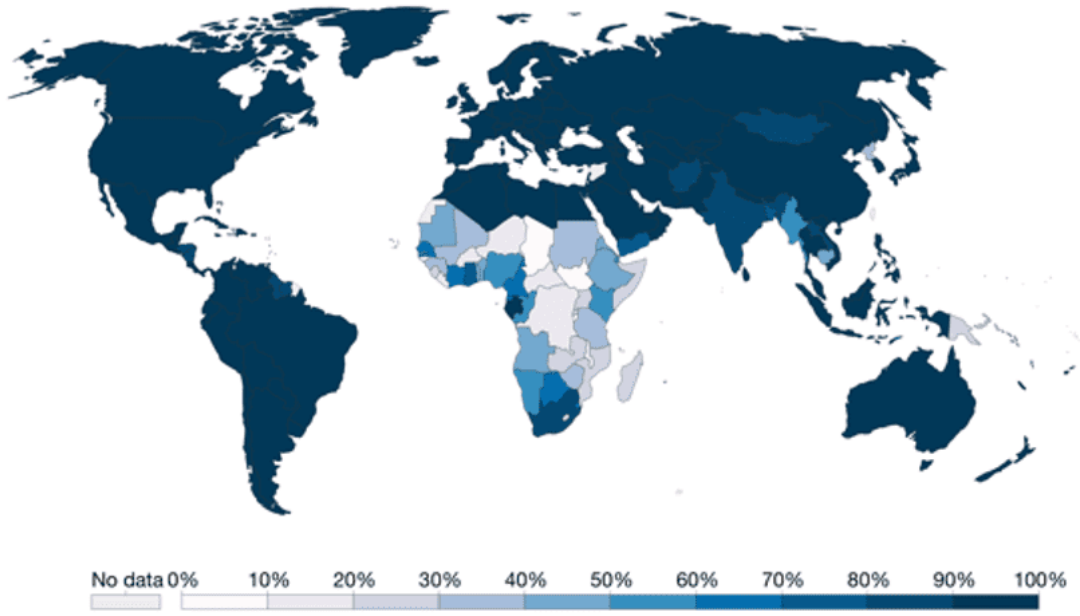


Figure 1 Share of population with access to electricity in 2016. Source: Ritchie & Roser, Our World in Data, 2019

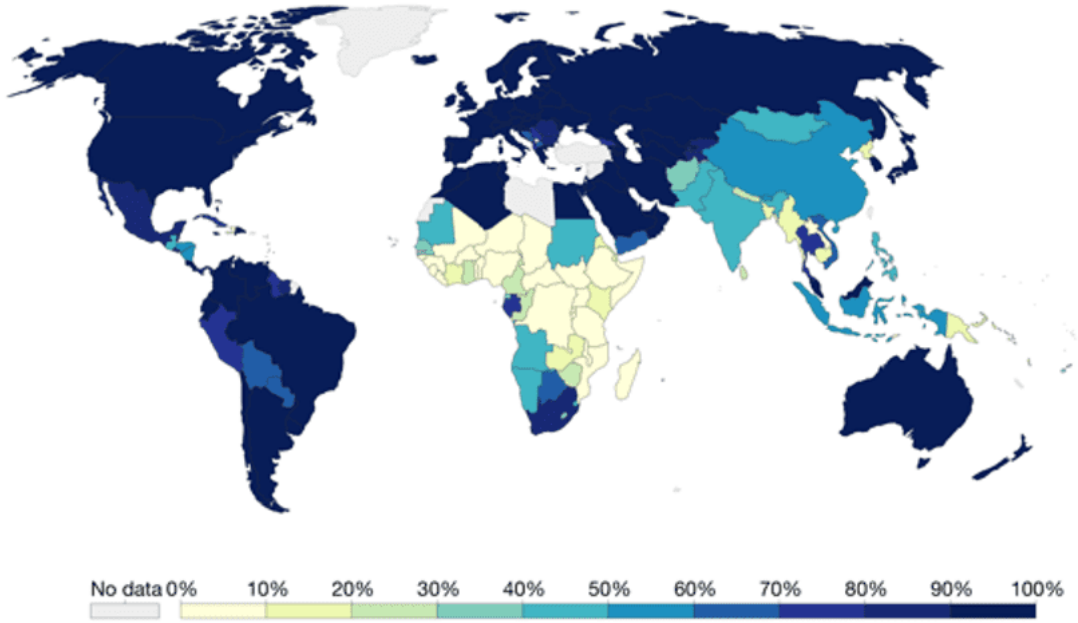


Figure 2 Share of population with access to clean fuels and technologies for cooking in 2016. Source: Ritchie & Roser, Our World in Data, 2019

2.1.1 Urban versus Rural Energy Development

The development of energy, which is in line with SDG 7 focuses on electrification and energy for clean cooking, has two different approaches in SSA: the development of urban energy and of rural energy. According to Deichmann et al. (2010), urban and rural problems are different and require different development strategies. In urban areas, on average 75 percent of households are connected to an electricity line, whereas in rural areas this is much lower: 25 percent (IEA, 2019). Urban populations often have inefficient and unreliable energy systems for electricity and more than fifty percent of the urban population in African countries live in informal settlements with often a lack of access to formal electrification services (Tusting et al., 2019). Rural populations often do not have access to basic electricity services because they are not affordable (Deichmann et al., 2010). Furthermore, in many SSA countries governments struggle to connect rural households because of the remote locations and economic infeasibility.

The cooking sector in both urban and rural areas is still very much dependent on traditional biomass, in particular wood, charcoal and agricultural residues (Kahsai et al., 2011). Energy for cooking still dominates domestic energy demand in most SSA countries, but the development of a sufficient clean cooking sector is lacking (Karanja, Mburu & Gasparatos, 2019). In general, a considerable share of the population in SSA countries uses improved cookstoves (ICS) which still use biomass as a resource, but in a more efficient way. Official clean cookstoves use LPG, electricity, solar or ethanol as energy source (Koo et al., 2018), but are considerably more expensive. Besides affordability, the clean cooking sector is progressing much slower than the electricity sector because of lack of awareness, willingness to pay for clean cooking, easy access to free traditional fuels (especially wood supplies are often not bought by consumers but are gathered in nearby forests), and cultural, environmental and technical barriers (SE4All, 2015).

2.1.2 Financing Mechanisms for Energy Usage

Just as there are differences between urban and rural areas, financing mechanisms in both geographic areas are not the same either. In urban areas, the access rate to a national grid connection is significantly higher than in rural areas, mainly because of the approachability of urban areas compared to rural areas and because of the higher economic potential in urban areas. The main way for urban households to pay for their electricity through a grid connection, is via prepayment options. This is a financial mechanism that makes consumers pay upfront for a certain number of kilowatt-hours (kWh) and has to be topped up again once the limit of kWh is reached. Baptista (2015) explains it as a two-sided development: on the one hand, it allows urban households with an irregular income to decide for themselves how and how much electricity to use and it allows them to stay debt-free. On the other hand, it is seen as a 'market-oriented concern with demand management' (Baptista, 2015, p.4). It allows governments to raise prices every now and then, because customers are not linked to a predetermined fixed price or a contract. It can therefore be discriminatory against poor citizens (Ruiters, 2011).

According to Deichmann et al. (2010), the least-cost option for SSA countries is using a national mix of centralised and decentralised power (grid and off-grid power). Decentralised power, for example in the form of mini-grids and Solar Home Systems (SHS) is the most optimal alternative in rural areas in many SSA countries, considering the potential for renewable energy and the obstacles for the national grid in reaching many rural, remote areas. Decentralisation has already been proven very effective in SSA when looking at the increase in mobile phone connections over the last thirty years. Since 1993, coverage in mobile phone use has increased with 55 percent per year, which resulted in a total coverage rate of 75 percent in 2019 (Elliott, 2019). The success factor is the financial service that comes with it (IEA, 2019). There are many cost-sharing arrangements that make it possible for more households to afford a mobile phone (Deichmann et al., 2010). The wide availability of mobile phones has now been proven useful in the decentralisation of electricity systems as shown by Soltowski et al. (2019). The authors mention that even though many rural households live remotely, the large accessibility of mobile phones ease the options for communication between off-grid providers and consumers which enables remote digital payments and the remote control of off-grid assets. Off-grid providers are often private sector investors and international and local NGOs and hence play a major role in this development.

As mentioned earlier, the clean cooking sector suffers from many barriers for households to switch from traditional energy sources to modern sources. Unlike the electricity sector, not much attention has been paid to the clean cooking sector by the international community and even less by national governments in SSA ,mainly because of the cultural habits in countries. The much-needed investments in the clean cooking sector have only seen a rise after the start of 2020, since the World Bank launched its Clean Cooking Fund worth of 500 million USD in November 2019 (World Bank, 2019a). Again, private sector investors and NGOs play a major role in this sector, but the only financial mechanism available at the moment is 100 percent upfront payment of the total costs.

2.2 Stakeholders and Stakeholder Partnerships in a Development Context

This research puts a central focus on the role of individual, both end-user and non-end-user stakeholders and more and more stakeholder partnerships in the energy development of SSA countries. This sub-chapter first describes the 'stakeholder' concept, to clarify definitions and discussions in literature, and then moves on to the concept 'partnership', the emergence of it in international spheres, the transformation from 'partnership' into 'multi-stakeholder partnership' and aligned debates. The next sub-chapter then connects the academic literature of MSPs to the broader concept of global governance.

2.2.1 Stakeholder Theory

After the launch of Freeman's article *Strategic Management: A Stakeholder Approach'* in 1984, the focus of studies on stakeholder theory has been on the interdependence and interaction between a private corporation and its stakeholders (Mitchell, Agle & Wood, 1997; Jones, 1995; Jones, Harrison & Felps, 2018). Freeman (1984, p.46) defines a 'stakeholders' as *"any group or individual who can affect or is affected by the achievement of the organization's objectives".* The degree of 'to affect' or 'being affected' was described by Mitchell, Agle & Wood (1997) as the degree of stakeholder salience, which is dependent on the amount of power, legitimacy and urgency a stakeholder has. "Power and urgency must be attended to if managers are to serve the legal and moral interests of legitimate stakeholders" (Mitchell, Agle & Wood, 1997, p.882). To adequately manage stakeholders, Jones (1995) argued that the firm's trust in and cooperation with stakeholders gives a competitive advantage over those that do not use those criteria and also helps in solving problems related to opportunism.

Stakeholder theory describes the interaction and interdependence between a company and stakeholders and therefore inherently discusses the influence stakeholders and companies have on each other, which is key to this research. The definition used by Freeman in 1984 will be used throughout this research, as it focuses on both the stakeholders who affect the company, as how they are affected by it. The 'company' in this sense is not a private company but implies the Rwandan government that has core responsibility over the energy sector development that aligns with the targets of SDG 7.

The influence of stakeholders on the implementation of policy strategies in a country, which in this research is more relevant than the implementation of business strategies, has been researched by Ruggiero, Onkila & Kuittinen in 2014. With a specific focus on renewable energy, they discovered three types of stakeholder influence: how projects or policies are triggered by stakeholder influence, how these projects or policies benefit stakeholders and how stakeholder influence can hinder the development of projects or policies. The first type focuses on governments, market factors and local community cultures as stakeholders, the second type focuses on local communities, and the third focuses on industries, NGOs, experts, policymakers and professional associations (Ruggiero, Onkila & Kuittinen, 2014). Their result matrix is visible in figure 3 and shows with arrows in which way the level of influence is directed. The dotted lines mark the fact that these levels of influence do not have exact limits but exhibit fluid boundaries (Ruggiero, Onkila & Kuittinen, 2014).

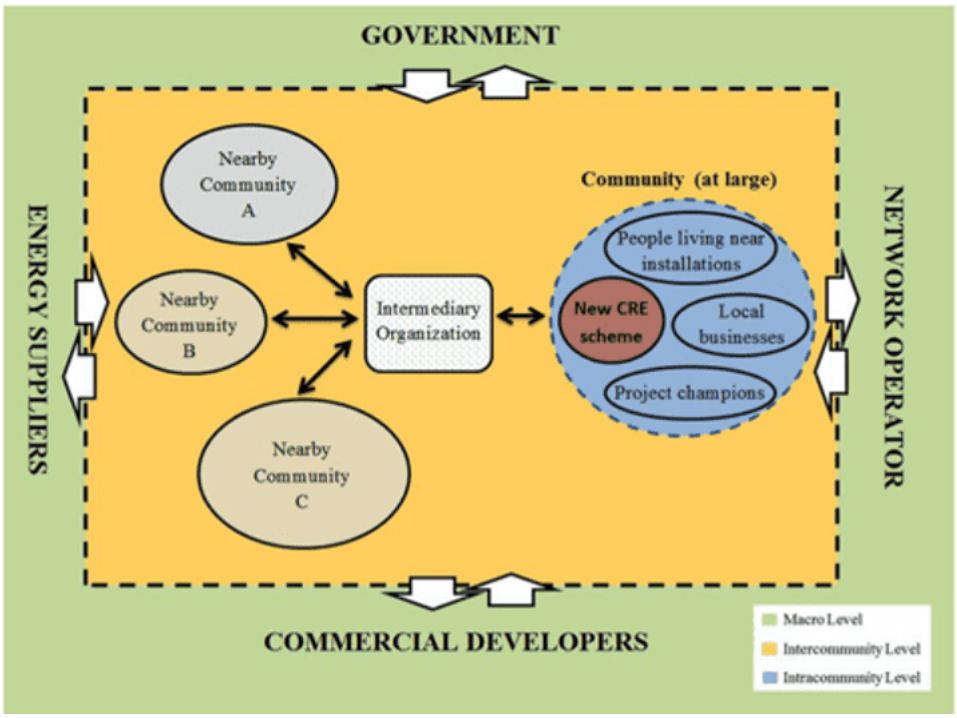


Figure 3 Stakeholder influence patterns on renewable energy development at country-level. Source: Ruggiero, Onkila & Kuittinen, 2014, p.57

2.2.2 International Partnerships

Besides academic literature on individual stakeholders involved in policies and projects on country- or case-level, there is a growing attention to partnerships involved in policies and projects. The term 'partnership' describes the interaction between two or more actors, who have a mutual agreement on collective action. Partnership literature is present in many fields of study, but for the sake of this research we focus on partnerships in international governance literature. Partnerships in governance literature can consist of actors from different fields: governments, international organisations, NGOs, business actors, civil society groups, academics, and several others (Pattberg & Widerberg, 2015). The merger of two or more actors together in a partnership merges perspectives from different fields of expertise and has the aim to broaden the problem-solving capacity that would not be possible for one actor operating alone. Pattberg & Widerberg (2015, p. 43) describe the problem-solving capacities of partnerships as: "the performance, success, and effectiveness to address the issue they have set out to solve". The partnerships' capacity in goal- and target-implementation differs per case: their role can be coordination, delivering technical input, advocacy, financing and/or service delivery (Clough, Long & Rietig, 2019).

In the current SDG-era, the perceived influence of partnerships has grown enormously, since the UN has devoted an entire SDG, number 17, to partnerships and their supporting role in achieving the other sixteen SDGs. Looking at the partnerships registered on the UN SDG platform, they consist in sixty percent of the cases of two to ten partners (Clough, Long & Rietig, 2019). What is important to highlight is that also sixty percent of the registered partners is led or facilitated by NGOs or international governmental organisations, while roughly ten percent is led or facilitated by governments or private businesses (Clough, Long & Rietig,

2019). However, instead of looking at leadership only, literature mentions that participation in partnerships is often biased towards donor governments, UN agencies, other international organisations and international NGOs (INGOs), typically with Western origins (Horan, 2019). Participation of the private sector, research institutions, local authorities and grassroots organisations remains limited, even though the aim of the UN was to include exactly these parties (Horan, 2019).

There is a clear distinction between the opportunities and challenges partnerships face in international governance, with challenges tending to be more numerous than opportunities. Even though literature perceives partnerships as an added value to international problem solving in the implementation phase of goals and strategies (Clough, Long & Rietig, 2019), many researchers highlight the problems of legitimacy, transparency, finance and inclusion within partnerships, especially in Multi-Stakeholder Partnerships (Van Huijstee et al., 2008; Schäferhoff et al., 2009; Pattberg & Widerberg, 2015; Dodds, 2015). Chapter 2.2.2.2 will elaborate on this. Chapter 2.2.2.1 aims to clarify the establishment of the definition 'partnership' and how this is transformed into the way we know partnerships in the current situation.

2.2.2.1 The History of Contemporary Partnerships

During the 1992 Earth Summit in Rio de Janeiro, a first explicit focus on partnerships for the importance of sustainable development was established in the *Rio Declaration on Environment and Development*. "States shall cooperate in a spirit of global development" and "States and People shall cooperate in good faith and in a spirit of partnership" were the guiding lines for cooperation for sustainable development (UN, 1992). The Declaration was solely focused on intergovernmental cooperation, with involvement of 'key sectors of societies and people' (UN, 1992). According to Van Huijstee et al. (2008), it can be seen as the take-off for collaboration between actors from the different spheres of society. Partnerships were considered important because of on the one hand the complex character of sustainability problems, which demands active involvement of all parts of society, and on the other hand the need for mutual attainment of social equity, environmental health and economic wealth which needs attention from different societal spheres since responsibilities and resources are allocated differently (Van Huijstee et al., 2008).

During the next Earth Summit one decade later - the *World Summit on Sustainable Development* (WSSD) 2002 in Johannesburg - the meaning of the word 'partnership' transformed into a more inclusive, but also a less binding definition. They were "collaborations between national or subnational governments, private sector actors and civil society actors who form voluntary transnational agreements in order to meet specific sustainable development goals" (Dodds, 2015). The most visible difference here is the addition of the private sector and the explicit division of governmental layers: national and sub-national. This enabling environment developed for the MDGs still exists to this day in the SDG era. The Johannesburg Partnerships are called *Type II Partnerships*, which are, according to Dodds (2015, p. 6), partnerships that are meant to complement Type I political outcomes or agreements and commitments made by governments.

2.2.2.2 Multi-Stakeholder Partnerships: Concepts and Debates

Since the 2002 WSSD, Type II Partnerships have become more mainstream implementation mechanisms in international governance structures, especially in attaining international sustainable development goals (Pattberg & Widerberg, 2015). As explained earlier, sustainable development requires cooperation between different actors and different fields of knowledge coming from different layers in society. Therefore, these Type II multi-stakeholder partnerships (MSPs) can be defined as "institutionalised transboundary interactions between public and private actors, which aim at the provision of collective goods" (Schäferhoff et al., 2009, p. 455; Beisheim & Simon, 2018, p. 497; Pattberg & Widerberg, 2015, p. 43). In the literature, there are several debates ongoing regarding partnerships, both public and private, and MSPs.

The first debate concerns the effectiveness of MSPs. As explained earlier, effectiveness can be described as "the problem-solving capacities of partnerships to address the issue they have set out to solve" (Pattberg & Widerberg, 2015, p. 43). Since 'problem-solving capacity' still sounds broad and vague, Dodds (2015, p. 12) added extra definitions:

- The process to address urgent issues
- The promotion of better decisions by using the widest input from stakeholders
- The creation of commitment and ownership through the participation of stakeholders and thus increasing the likelihood of successful implementation.

According to the Global Knowledge Partnership (2003), MSPs create lasting and meaningful impacts at all levels of action and apply a more holistic approach to development and better governance. MSPs are especially successful when stakeholders have unique, complementary strengths or when core competencies add value to development efforts and pool their resources and assets in solving problems (Global Knowledge Partnership, 2003; Clough, Long & Rietig., 2019).

Despite the aimed potential for MSPs' effectiveness and reasons for success, critical literature studies have grown over the years. Partnerships have a limited track-record in terms of effectiveness, because many partnerships have internal working problems and the ability to deliver objectives (Schäferhoff et al., 2009; Pattberg et al., 2012; Pattberg & Widerberg, 2015). This specifically implies effective leadership, willingness of participants to invest time and resources, process management, institutionalisation, adequate funding and adaptability to local conditions (Horan, 2019). Besides this, partnerships remain ineffective because of the extent of overlap or mismatch between them (Horan, 2019). In 2017, there were 2197 partnerships registered on the UN SDG Platform and there will undoubtedly be more outside the UN. Because of the voluntary and bottom-up character of partnerships, it is hard to keep track of their existence (Horan, 2019).

Another point of critique is that the aimed inclusiveness of MSPs, especially on the SDG Platform, is more exclusive than inclusive and therefore lacks effectiveness. Most partnerships do not include previously marginalised actors, like local authorities, grassroots organisations, women and youth (Clough, Long & Rietig, 2019). Lastly, there are doubts whether there are

lessons learned from the effectiveness of MSPs operating in the MDG-era. The role of MSPs was not as big as during the current SDG-era, however, their position was still significant. Most of the MDGs failed to be successful. According to Beisheim & Simon (2018), after the WSSD 2002 in Johannesburg, the UN never systematically assessed under what conditions its MSPs actually contributed to sustainable development and the current enabling environment for MSPs does not seem to have changed much. There is little evidence whether the Type II bottom-up transnational multi-stakeholder arrangements are a contribution to addressing global change (Pattberg & Widerberg, 2015)

This leads to the next subject of critique: transparency. The influence of partnerships has been growing over the years and has reached a peak after the establishment of the SDGs. The progress and successfulness of reaching the Goals is highly dependent on the work of individual stakeholders and MSPs and because of the multitude of partnerships, sufficient levels of transparency are required to measure the progress of SDGs. Many researchers have discovered issues with these levels of transparency, particularly in the area of monitoring and evaluation. Clough, Long and Rietig (2019) conducted a survey among 900 of the partnerships registered on the SDG Platform, and concluded that only 45 percent of respondents have a clear set of criteria and metrics for evaluation, and only 42 percent share their progress reports publicly. The filing of systematic updates on the website of the SDG Platform is even lower: eight percent in 2018 (Clough, Long & Rietig, 2019). Appropriate monitoring is often not possible because many governance structures of MSPs are 'terra incognita' (Dodds, 2015). On top of that, MSPs have developed vague or diffused goals, which contributes to the difficulties of measuring outputs and impact and can therefore not often be found in literature (Van Huijstee et al., 2008; Pattberg & Widerberg, 2015). Hence, this creates uncertainties about whether specific means of implementation actually satisfy the rate of success in the implementation phase.

The last debate concerns the reason for the emergence of Type II MSPs and the political climate. As explained earlier, MSPs are often praised for their inclusiveness and their broad scope of knowledge, expertise and outreach to target groups. According to Beisheim and Simon (2018), stakeholders see reasons for partnering because material and immaterial needs that are lacking for them as individuals. Material needs are for example funds or specific technologies. Immaterial needs can be knowledge and increased legitimacy (Beisheim & Simon, 2018). Also, the UN sees benefits in partnering with especially non-state stakeholders, to extend legitimacy. Clough, Long and Rietig (2019) found in their survey that 65 percent of the 900 respondents are generating new solutions that they could not have achieved alone. Besides, Clough, Long and Rietig (2019) discovered that in the area of resource sharing, sharing of learning, expertise and access to networks were more common than sharing of finance and technology.

Critics see the development of MSPs and also the Global Partnership for Sustainable Development as an extension of neoliberal policies developed in the 1980s. As Martens (2007) states, MSPs are having more and more impact on global governance, however, this can pose a risk on the legitimacy of governments in decision-making, since the influence of businesses on agenda-setting is growing, especially in developing countries (Zammit, 2003). According to Bull (2010), strong private sector involvement leads to increased fragmentation of global

governance, “market multilateralism” and the redesigning of public policies according to private interests rather than public needs. A problem that has been present for decades now, is that the geopolitical climate often hampers transformations and is not conducive to global cooperation. It becomes even more difficult when powerful private actors are involved. This is especially the case in the fields of energy, environment and trade, since these complex themes often require unpopular interventions from stakeholders.

Even though the influential role of the private sector actors in international governance and MSPs cannot be ignored and undoubtedly plays a significant role in decision-making, the neoliberalism critique can be toned down to a certain extent, because a majority of partnerships is led by international organisations and state agencies and not by business actors. Therefore, the partnership approach cannot easily be subsumed under a ‘privatization of governance’ framing (Pattberg & Widerberg, 2015).

2.3 Stakeholder and Partnership Involvement: The Global Governance of Sustainable Development

To investigate the influence of individual stakeholders and partnerships over the years, it needs to be understood how strategies developed for sustainable development and the SDGs were established and how they are governed. Since the goals target all UN-member states and other linked stakeholders like the private sector and development agencies, an influential position for global governance seems inevitable. However, there is much criticism of the role of SDGs as global governance structure and the importance of partnerships.

2.3.1 The Concept of Global Governance

Thomas Weiss (2014, p.2) formulated a definition for ‘global governance’ as: “the sum of all informal and formal values, norms, procedures and institutions, that help all actors – states, intergovernmental organizations, civil society, transnational corporation, and individuals – to identify, understand, and address transboundary problems.” Since the end of the 1980s, sustainable development has become an influential factor in governing the relationships among environment, economic and social issues (Hanson, 2007).

According to Hanson (2007), global governance in the field of environment and sustainable development has known successes up until now. Biermann et al. (2017) and Hanson (2007) mention that the main importance of the goals is to not stick to original plans forever, but to approach them in an adaptive way. Long-term consistency is preserved, but fresh, new approaches should be introduced when the time allows it (Hanson, 2007). This implies for the SDGs that there should be room for adaptability, since policies, regulations and technologies developed in 2015 may be outdated in 2025. According to Hanson (2007), global governance is also successful when agreements become embedded in national decision-making, when cooperation exists between developed and developing countries, when there is enough funding for capacity building and when the political ownership of problems continues to be at the global level, i.e. the UN and NGOs. Biermann et al. (2017) add to this that partnerships are viewed as an innovative feature of the SDGs in comparison to previous global governance strategies.

2.3.2 Criticism on and failure of SDGs as global governance

Criticism on the functioning of SDGs as a global governance institution goes into the positive sides of global governance addressed by Biermann et al. (2017) and Hanson (2007). It addresses the neoliberal nature of the concept, which leads to the increasingly weakened decision-making position of governments on the country-level and at the same time the growing dependence on non-governmental actors, and it challenges the 'new' and 'innovative' nature of the SDGs.

The SDGs were developed with the intent to be prescriptive: what the world *should* look like in fifteen years and how this *should* be achieved. A major difference in this between the SDGs and MDGs is the addition of SDG 17. Gleckman (2016) argues that the role of non-governmental actors, like corporations, academics and civil society increases on country-level, which leads to increased dominance of multi-stakeholder engagement on the ground. This is of major importance according to SDG 17 and is also described in SDG 7.

The focus on partnerships within the SDGs diminishes legitimacy of decision-making and independent acting on country-level. According to Eriksen et al. (2015), the notion of the UN to 'transform our world' with the SDGs is not challenging root causes because it has to keep all stakeholders within the SDGs satisfied. Blythe et al. (2018) line out several risks associated with this, of which three have the most consequences for developing countries. First, the risk of shifting burden of response onto vulnerable parties, like citizens instead of states and developing instead of developed countries. Second, the risk of justifying business-as-usual and third, the risk of excluding the possibility of non-transformation or resistance because of the all-encompassing nature of the SDGs.

The second risk also assesses the article of Biermann et al. (2017), stating the 'novelty of the SDG agenda'. There are many signs the SDGs are not novel in its core, but more business-as-usual. It is true that the SDGs are more all-encompassing, addressing developed and developing countries and there is more focus on the long-term vision of the goals. However, there are no drastically new aspirations. As Hickel (2015) and Pogge et al. (2015) argue, there is still the pursuit of endless industrial growth (goal 8: 7 percent annual GDP growth in least developed countries), there is still no serious focus on reduction of income inequality and the biggest drivers of poverty are again left unaddressed.

2.3.3 MSPs & Global Governance

Since MSPs in the current SDG-era on the one hand often have a transnational base or operate transnationally and on the other hand all together play an influential role in country policy-implementation and SDG implementation, the entity 'MSP' and its role in the international playing field can be viewed as a form of global governance. There have been many definitions developed around 'global governance', starting with one by Hampson and Cox (1997, p. 16): "the procedures and practices which exist at the world (or regional) level for the management of political, economic and social affairs". However, this rather limited definition leaves much room for interpretation and does not elaborate on potential actors involved. Besides, what is the 'management of politics, economics and social affairs' on the world stage? Thomas Weiss

(2014, p.2) formulated a more detailed definition in 2014 for 'global governance' as: "the sum of all informal and formal values, norms, procedures and institutions, that help all actors – states, intergovernmental organizations, civil society, transnational corporation, and individuals – to identify, understand, and address trans-boundary problems." This definition describes the actors involved in a better way and distinguishes informal and formal actions, but it does not comply with the way MSPs work: in collaboration. Therefore, by merging the 'governance' definition of Ruggie (2010, p. 15): "the workings of the system of authoritative rules, norms, institutions, and practices by means of which any collectivity manages its common affairs", global governance in the field of MSPs can be formulated as:

The sum of all informal and formal values, norms, procedures, institutions and practices, that help any collectivity of actors - national and sub-national states, intergovernmental and international organizations, civil society, private sector actors, academics, and grassroot groups including previously marginalised groups - to identify, understand and address trans-boundary problems, and manage their common affairs.

In the field of global governance, not much empirical research has been done nor has there been a focus on informal patterns that occur in practice. The article of Pouliot & Thérien (2017) is one of the few articles diving into this practice approach and making an attempt to fill in the gaps that exist between bodies of legal rules and actual procedures. They discover four patterns in the practice of contemporary global governance, of which the formation of an MSP is one. They link the formation of MSPs to global governance in practice, because the creation of partnerships between multilateral organisations and non-state actors is one of the most efficient ways of bringing together stakeholders from different backgrounds and from different layers in society that together can address transboundary problems like the ones addressed in the multiple SDGs. It is fast and efficient because the establishment is "loose, enduring, voluntary and non-hierarchical, and a common interest in resolving a problem is of shared concern" (Pouliot & Thérien, 2017, p. 169-170). They can also successfully deliver governance services when they are focused on fit-for-purpose institutional design and process management (Beisheim & Liese, 2014). Over the years, these partnerships have evolved from a novelty in the multilateral setting to a widespread practice to address and solve global issues (Bexel & Mörth, 2010, p. 18). It is a so-called 'decentralised governance structure, or polyarchic authority' (Raymond & Denardis, 2015, p. 573).

Besides the opportunities of MSPs as actors in global governance, it is stated in research that many of them can be arbitrary, self-mandating and based on exclusiveness (Pouliot & Thérien, 2017). As Bob (2012) explains, MSPs are often characterised by homogeneity as those who collaborate in a partnership already share a particular worldview and therefore exclude or do not look for dissident voices to join the partnership. Besides, marginalised groups are often excluded because of dissident mindsets or because they simply cannot find their way into the thousands of partnerships present in governance structures. This is visible in the fact that there are still far more North-North partnerships than there are North-South and even less South-South partnerships. The fact that some networks are just another way for already powerful players to achieve this goal, strengthen the gap between Northern-based and Southern-based

partnerships. Lastly, as mentioned before, there is an accountability challenge: the lack of public oversight and transparency makes it difficult for outsiders to evaluate the procedural legitimacy of these initiatives (Pouliot & Thérien, 2017).

To evaluate the way partnerships work in practice, empirical evidence is needed in literature. To summarise this chapter, table 1 forms an overview of the challenges and opportunities described in this chapter It not only forms a valid roadmap for this research, but also for other research in the future. The information in the table is based on the article of Pattberg & Widerberg (2015), and lines out nine conditions for improved performance of MSPs in the SDG-era and are divided into three overarching categories: actors, process, and context.

Table 1 Nine Conditions for Success for Multi-Stakeholder Partnerships divided into the categories 'actors', 'process' and 'context'. Source: Pattberg & Widerberg, 2015

Category	Conditions for Success	Description
Actors	Optimal partner mix	Mix of resources, knowledge and capabilities • Combined willingness, capability, resources of partners, engagement from most powerful and influential members (Beisheim, 2012; Newell et al., 2012) • Omitting powerful and important stakeholders can lead to suboptimal performance (Gray 2007; Wigell, 2008)
	Effective leadership	The start of a partnership needs an entrepreneur, convener or orchestrator • Remains difficult to operationalise • Remains critical to identify and manage different types of leadership
Process	Stringent goal setting	High levels of precision limit room for interpretation, lower degree of precision allow for discretion and interpretation • Aligned with international norms • Trust building and improved collaboration are linked to level of consensus regarding strategies and goals, which in turn increase likelihood for success
	Sustained funding	Limiting funding coming from one source • Limit reliance on membership fees or voluntary funding from members • Funnelling money generated from activities back to the organizations.
	Professional process management	Small governing board of major donors, supported by a secretariat and room for input by a select group of affected stakeholders • Common strategic plans, clear division of roles, responsibilities, multilevel forums to coordinate funding and resources • Having full-time staff employed • High level of institutionalisation preferable compared to loosely coupled network structure • Balance between level of institutionalisation and the amount of red tape • Strong corporate identity
	Regular monitoring, reporting, and evaluation to support organisational learning	Has a positive effect on the performance of MSPs because: • Enables organisational learning (adaptive capacity) • Public and private constituencies are increasingly demanding accountability and disclosure of spending and impacts of financial or in-kind contributions • Needed to enhance transparency (process legitimacy)

Context	Active meta-governance (to mitigate the risk of "conflictive fragmentation")	Goals of MSPs should be checked against a number of criteria to determine their conduciveness to i.e. UNFCCC and other international policy goals (SDGs). • There should be a bureaucracy with the mandate and power to vet new initiatives against set criteria (and avoid i.e. bluewashing).
	Favourable political and social context	Governance architecture: Mapping governance architecture and social and political context is central to understanding the opportunities and challenges to implementation. Increases the possibility to tailor-made solutions rather than a one-size- fits all approach. Partnerships are: • Complementary (in multilateral regimes) • Eroding public authority (when filled function used to be carried out by governments) • Reinventing politics (if functions are fulfilled in a new manner) Partnerships with implementation at local level are highly dependent on local conditions. Local capacity building to create institutional conditions for implementation is a necessary strategy to pave the way for a successful arrangement (Beisheim & Liese, 2014, p. 208).
	Fit to problem-structure	Malign vs. benign problems: • Malign: high levels of complexity, competing interests, unclear solutions: less likely to be solved • Benign: actors' interests and preferences converge, solutions are easier to identify • Recognise that every problem has distinct features with specific administrative problems and political constituencies and require different institutional setups. Investigate whether an MSP is the most appropriate solution to the problem at hand.

2.4 Knowledge Gap

Current literature on global governance-designed non-state stakeholder and partnership involvement and influence lacks sufficient empirical research in the light of policy implementation in target countries. To achieve goals like the ones mentioned in the SDGs, their position has gained prominence and hence increases their importance relative to national governments'. As Pattberg & Widerberg (2015) mentioned, there is little up to date evidence that Type II partnerships – bottom-up partnerships – have actually contributed to addressing global change subjects. The involvement of non-state stakeholders and partnerships is in this case meant to support counties in stimulating energy development, however, it is unknown whether they can actually fill this gap and whether energy consumers are satisfied with their support.

Next to the gap in empirical literature on non-state stakeholder and partnership involvement, it is unsure how developing countries will implement SDG-related policies and targets and which role governmental and non-governmental bodies can play. Many developing countries, especially SSA countries, are far behind reaching SDG 7. However, SSA countries often face issues with generalisation in literature, being 'all behind' or 'all poor'. This is mainly because

the SDGs also generalise in their targets and indicators aimed at 'developing countries', which is used as a guide for academic articles like Blythe et al. (2018) and Biermann et al. (2017). This research wants to investigate the case of Rwanda as an attempt to step away from generalisation and develop the establishment of unique cases, as Rwanda is making serious steps in moving away from dependence on development aid towards solid trade relationships.

2.5 Conceptual Framework

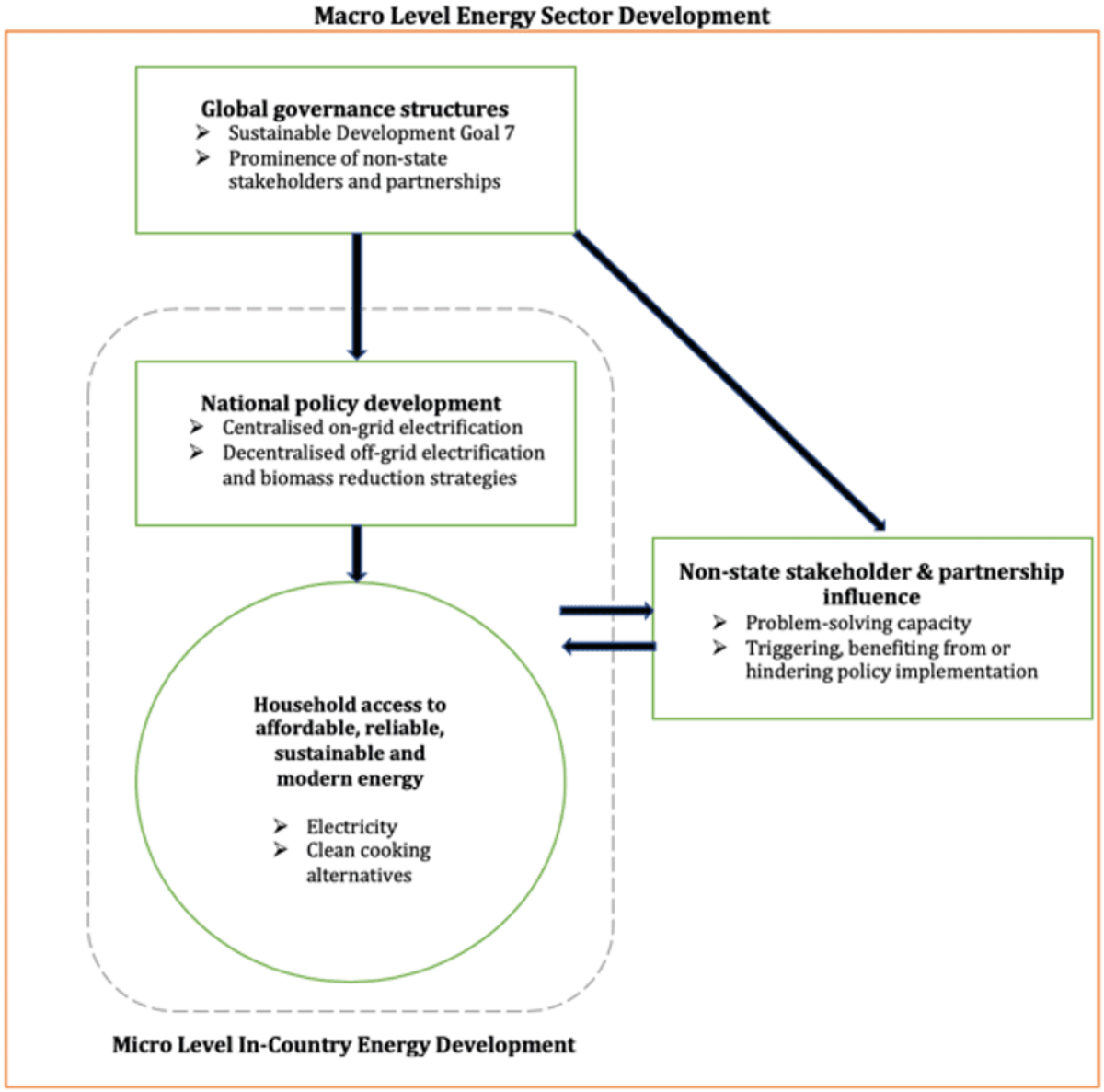


Figure 4 Conceptual Framework

Figure 4 shows the designed conceptual model for this research. The model shows an adaptive version of the model developed in the study by Ruggiero, Onkila and Kuittinen, 2014. Besides, it contains the problem-solving capacity of partnerships which is linked to the conditions for success lined out by Pattberg and Widerberg (2015) available in table 1. The development of the energy sector can roughly be divided into a macro and micro level. On the macro level, it

is visible how global governance structures, specifically in an SDG-era, lead to more participation of non-state stakeholders and partnerships on in-country energy development. Hence, the macro level has an influence on micro level, which consists of both national institutions developing energy policies and households being the target group and end-user of these designed policies. The dotted line resembles the hybrid character of influence between the macro and micro level, since the national institutions and households also have an influential role on the extent to which policies contribute to the goals of the global SDG structures and on the ability of and possibility for non-state stakeholders and partnerships to actually stimulate or hinder the potential for access to energy on household level and how these households respond to their involvement.

3. Country case study: Rwanda

Rwanda has been chosen as a case study for multiple reasons. Firstly, Rwanda has seen massive increases in access to electricity in the decades after the genocide, especially from 2010 onwards. Both the on-grid and off-grid sector are progressing, but the on-grid sector develops faster. Both sectors rely on support and investments of INGOs, NGOs and the private sector. This is linked to the second reason. In the last decade, the role of non-state stakeholders has become very influential, since the Rwandan government has assigned the development of the off-grid electricity and cooking sector entirely to private sector investors, INGOs and NGOs. Because of their influential position, it makes Rwanda an interesting case for this research, since it shows impressive increases in the sector compared to surrounding countries. A third reason and characterised as an issue present in many SSA countries, is the lack of improvements in the clean cooking sector, since 98 percent of the Rwandan population is still reliant on biomass for cooking. The last reason to choose Rwanda is because of an internship prior to this thesis that helped in the understanding of the energy sector and therefore served as an opportunity to successfully conduct this research.

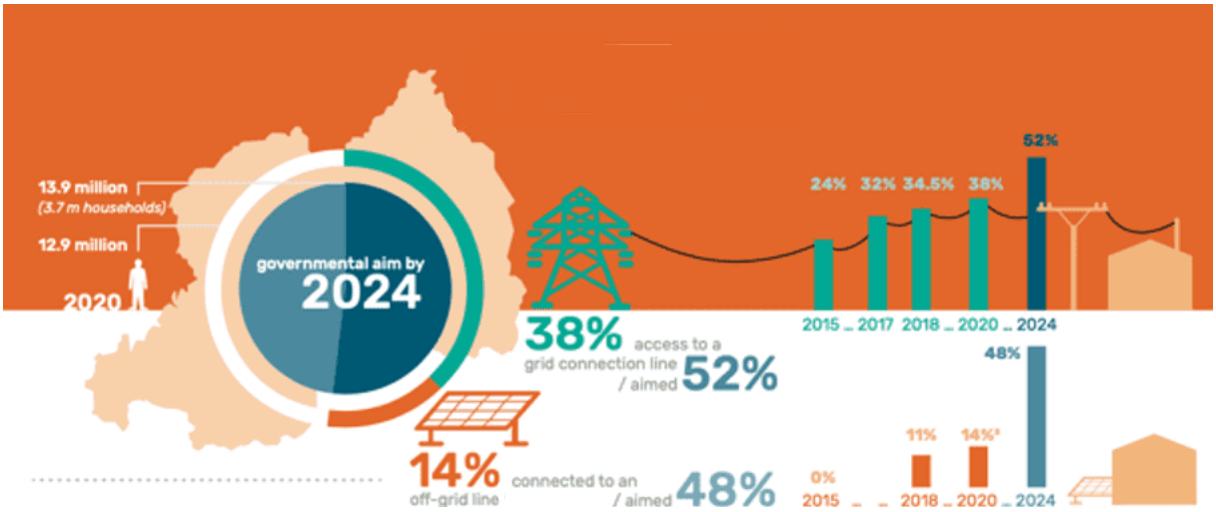


Figure 5 Rwandan Government's Targets for Reaching Universal Access to Electricity. Source: Resilience B.V, 2020

3.1 Rwandan Energy Usage

Rwanda is one of the smallest, most densely populated countries on the African continent. Around 12.5 million people live in an area of 26.338 square kilometres (Koo et al., 2018). The GDP has experienced an average growth rate of 7.5 percent since 2000 and a continued growth of 8 percent is expected until at least 2022 (Ministry of Infrastructure, 2018). 80 percent of the Rwandan population lives in rural areas and 52 percent of the total population has access to basic electricity[1], of which the majority lives in urban areas.

[1] IEA (2019, p.36) defines access to energy for households when 'the household has reliable and affordable access to electricity (and clean cooking facilities), which is enough to supply a basic bundle of energy services, and with the level of service capable of growing over time.' Basic electricity services are defined by the IEA (2019b, p.36) as owning a set of several lightbulbs, phone charging, a radio and potentially a fan or television.

Rwanda wants to become a middle-income country by 2035 and a high-income country by 2050 (Ministry of Finance and Economic Planning, 2016) and therefore the government sees the urge in reaching 100 percent access to electricity. 100 percent access should be reached, of which 52 percent is accountable for on-grid access and 48 percent for off-grid access. Rwanda commits to SDG 7 in policy documents like its flagship Energy Sector Strategic Program (ESSP) in 2018 and aims to reach universal access to electricity six years before the target year of the SDG, namely in 2024. To help increase the electrification rate, the Rwandan government is investing in on-grid projects. This is all developed and executed by the national utility company, the Rwandan Energy Group (REG). Almost all planned projects are (partly) funded by international donors or foreign private companies. For off-grid sector development, the Rwandan government especially appeals to private sector- and foreign investors to ensure that all Rwandan residents and industries can access energy products that are affordable, sufficient, reliable and sustainable. The private sector aims to help the government in realising these targets, since it can set up small-scale, modern energy services which are not achievable by the Rwandan government. These services in particular contain the development of SHS and solar- or hydro-powered mini-grids.

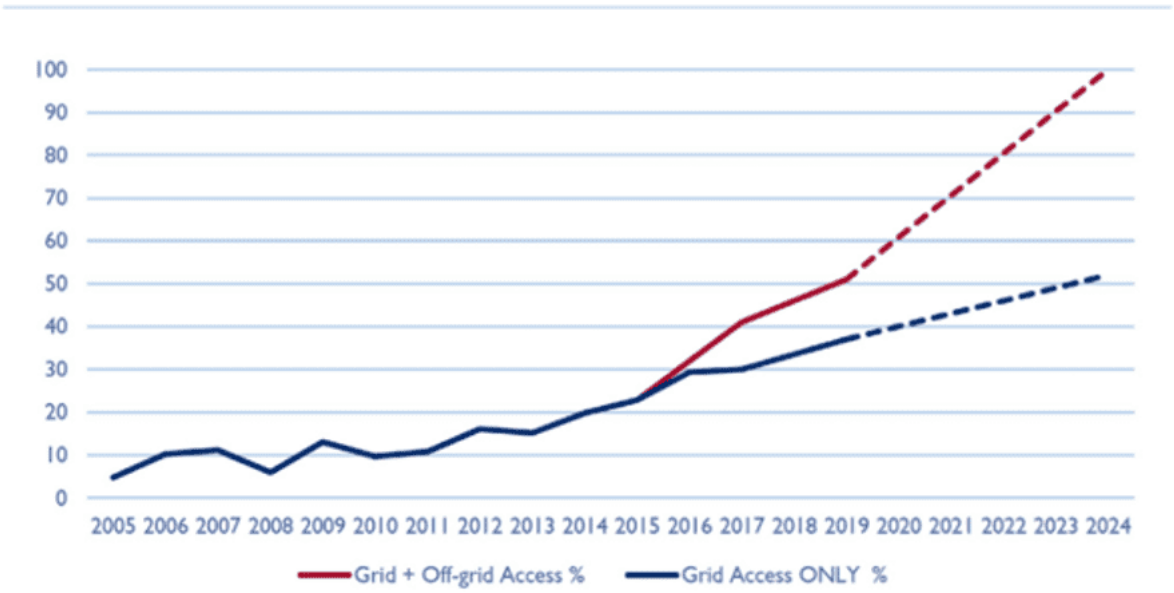


Figure 6 Energy Access in Rwanda from 2005 to 2019 and the Forecast to Reach the Target for Universal Access in 2024. Source: Power Africa, 2018

Cooking fuels in Rwanda are still mostly based on biomass, namely: wood, charcoal, dung and agricultural residues (FAO, 2019). Biomass accounts roughly for 85 percent of the total energy consumption by households. The market of charcoal (approximately 150.000 tons) accounts for 2 percent of GDP, with a total value of 50 million USD (GACC, 2012). The total value of wood for cooking is more difficult to measure, since a large part of wood is gathered by households, instead of bought. Firewood is the most common cooking fuel, utilised by 93 percent of rural households (Ministry of Infrastructure, 2019). 80 percent of the total Rwandan population uses

charcoal as cooking fuel,and in urban areas charcoal is used by 65 percent of households. By 2024, the Rwandan government aims to reduce energy consumption based on biomass to 52 percent.

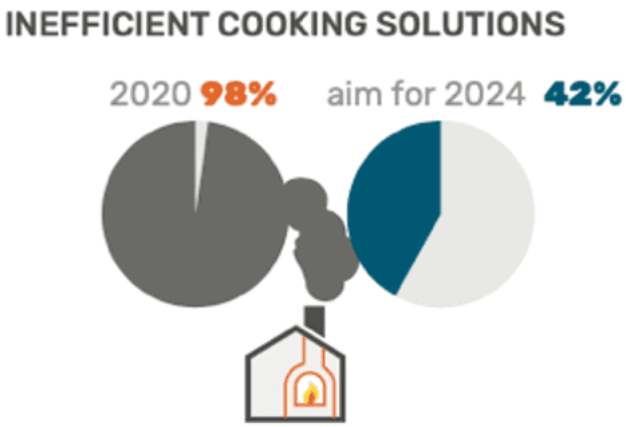


Figure 7 Rwandan Government's target for reducing biomass usage by 2024. Source: Resilience B.V., 2020

3.2 Stakeholders in the Rwandan Energy Sector

In the Rwandan energy sector, three types of stakeholders can be distinguished: energy policymakers, providers and consumers. Firstly, the ministry of Economics and Financial Planning (MinEcoFin) and the Ministry of Infrastructure (MinInfra) are the policymakers shaping the energy sector. MinEcoFin allocates the budget for investments and operations. MinInfra develops energy policies and targets, which have to be in line with the SDGs. Subsequently, these are executed by REG. REG directs the Energy Access Roll-out Program (EARP), in which the extension of access to electricity in Rwanda is planned. REG is the main contact for private energy investors that want to operate in the field of energy, both on-grid/off-grid and clean cooking. Rwanda Utilities Regulatory Authority (RURA) sets the tariffs for energy prices in Rwanda.

The main stakeholders besides public institutions are consumers and independent power producers (IPPs). IPPs are of crucial importance to the Rwandan government in helping to achieve its 2024 goals. Investors facilitate investments in amongst others hydro, methane, solar and peat generation. IPPs exist in both the on-grid and off-grid sector and are up until this date highly dependent on external funding and other forms of support in order to successfully operate in the system.

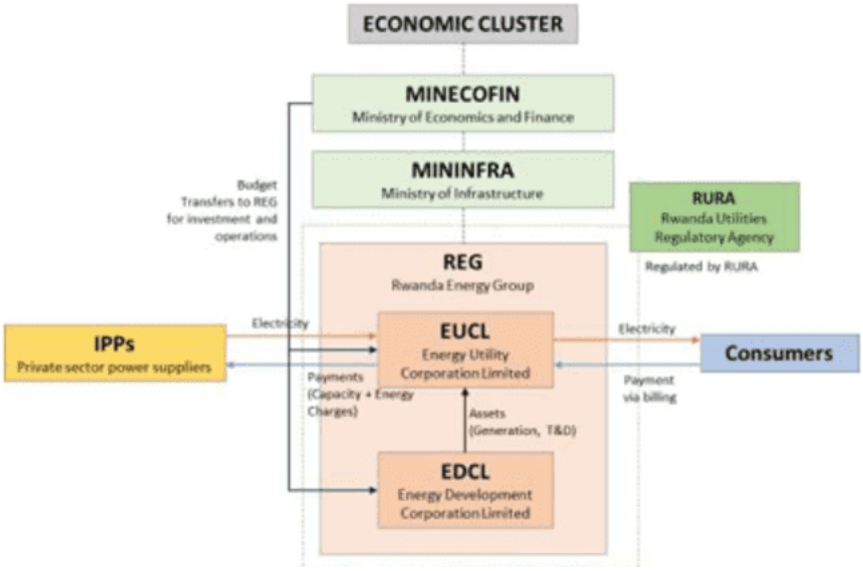


Figure 8 Operational Framework Energy Sector Rwanda. Source: Ministry of Infrastructure, 2018

4. Methodology

This empirical research executes a case study analysis, using both qualitative and quantitative research methods to answer each sub-question. The majority of data collection has been done by primary data collection using semi-structured and non-structured interviews and desk research. Below, the research strategy and methods for data gathering used are lined out.

4.1 Research Strategy

Figure 9 below shows the research strategy used. The strategy is divided into three compartments: researching and developing the theoretical framework, applying the theoretical framework on the Rwandan case by the design and investigation of four research sub-questions and summarising the findings into a synthesis in which all findings are discussed to eventually answer the main research question. The theoretical framework is shaped by extensive desk research into the concepts described in chapter 2. The theoretical framework forms the baseline for the four sub-questions and main research question. The questions are answered by in-depth research using both primary and secondary data. The first two sub-questions address the micro-level energy development situation in Rwanda and flow into sub-question 3 and 4 that address non-state stakeholders' and partnerships' position in relation to the national government and households. Thereafter, their opportunities and challenges in addressing existing gaps are discussed. All four sub-questions will then come together in order to discuss findings, answer the main research question and provide policy and academic recommendations.

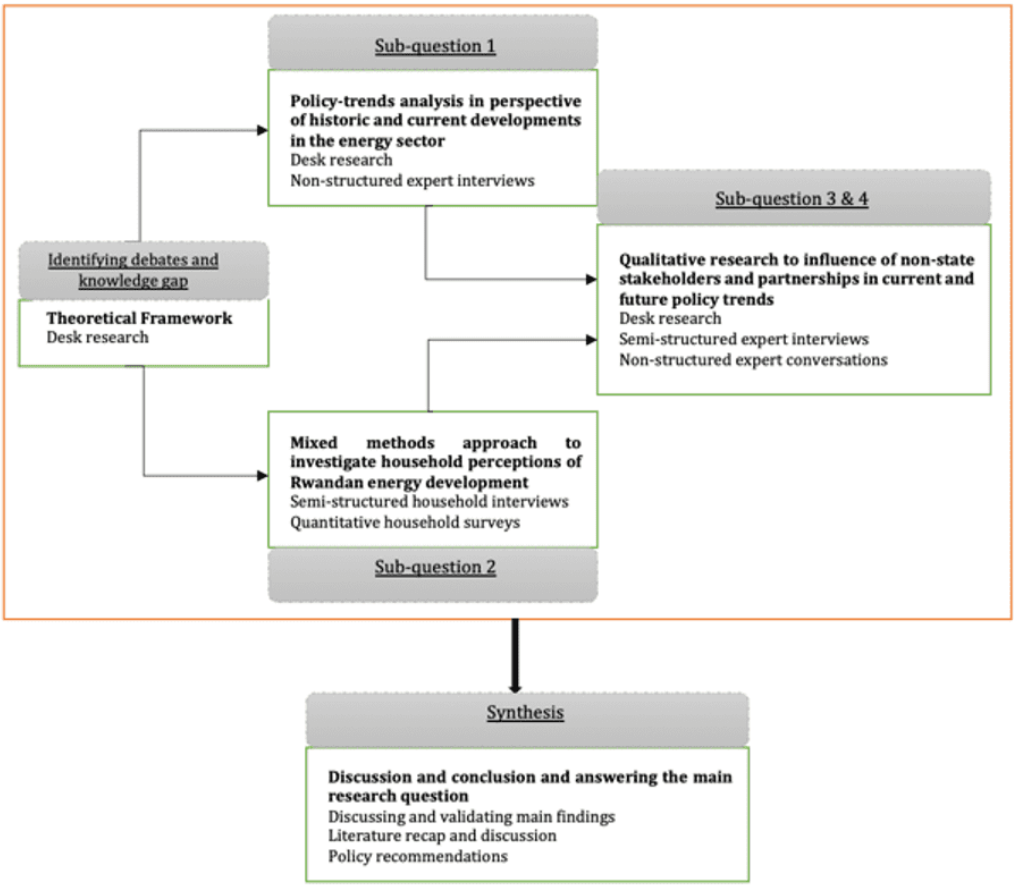


Figure 9 Research Framework

4.2 Operationalisation

The figures 10 to 13 show the operationalisation of variables described in chapter 2. Four variables were identified: (i) SSA energy development, (ii) global governance structures, (iii) non-state stakeholder influence and (iv) partnership influence.

The operationalisation of SSA energy development is visible in figure 10. To make the research towards development elements in SSA more specific, the concept was divided into two different compartments present in SSA energy development: centralised and decentralised development. Centralised developments specifically implied the increase in grid extension projects– government- or private sector-led - and the increase in households connected to the grid. For decentralised development, the focus has been on increases in electrification and clean cooking alternatives. For both developments, a comparison was used by applying a time frame of approximately 15 years, the time when energy development rates, in particular electrification, started to increase.

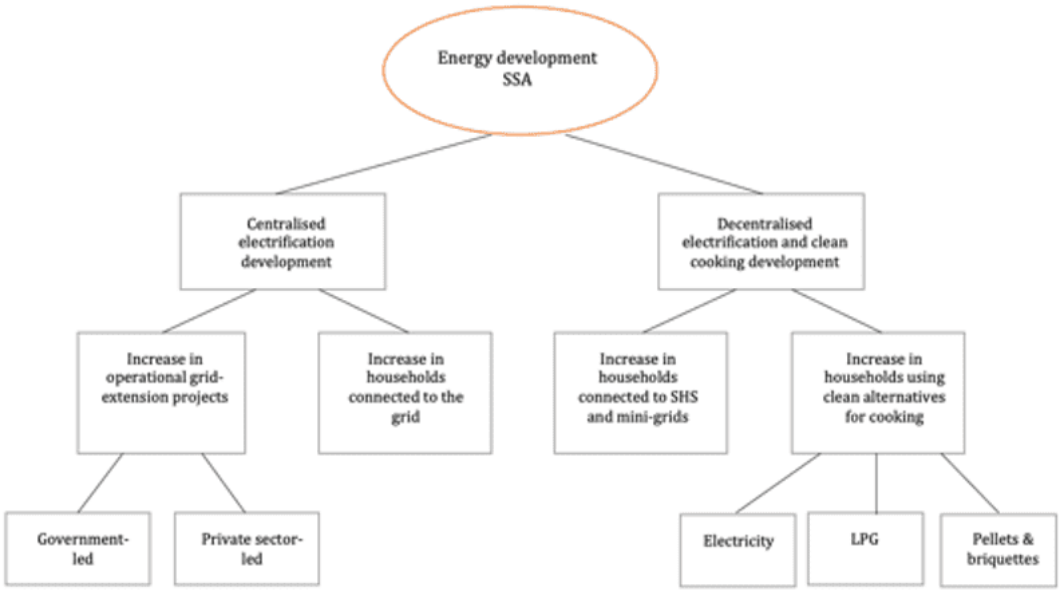


Figure 10 Operationalisation of the Concept 'Energy Development in SSA'

In figure 11, the concept of global governance structures is operationalised. This concept had a supportive role, since there is no specific research question regarding global governance. However, the concept helped to explain particular the energy development situation and the involvement and influence of external actors. The concept of global governance structures was operationalised as 'SDG 7' since the defined targets and indicators of the goal are implicitly or explicitly translated into national policy goals. SDG 7 calls for universal access to energy, increases in the share of renewable energy and improvements in energy efficiency and were measurable by the indicators in the lower part of the figure. SDG 7 calls for the promotion of investments in energy infrastructure and clean energy technology as a means to reach the targets

and creates an enabling environment for non-state stakeholders and partnerships. This leads to increased influential positions.

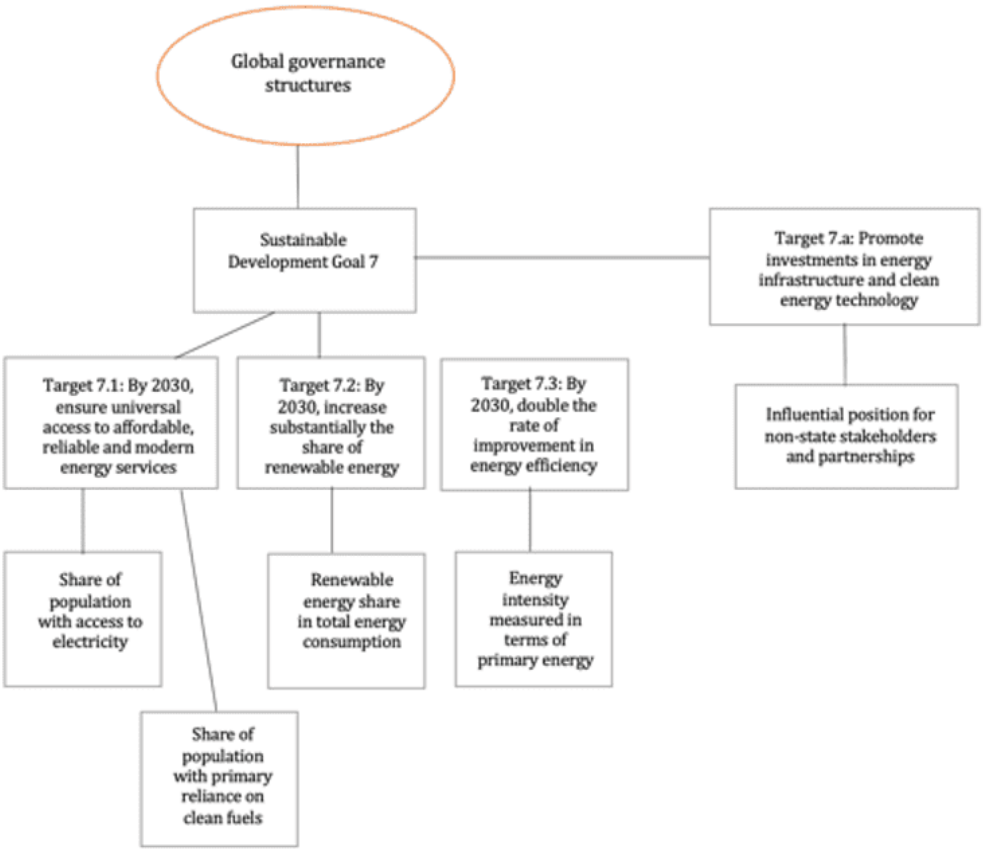


Figure 11 Operationalisation of the Concept 'Global Governance Structures'

Non-state individual stakeholder influence and partnership influence were operationalised in a relatively similar way, as is showed in figures 12 and 13. Since both concepts consist of stakeholders aimed to support energy sector development, their influence on country-level is similar. The main difference is the level of internal interaction present within partnerships, which has both opportunities and challenges in operations. Therefore, an extra block is added to partnerships which can be recognised from the study of Pattberg and Widerberg (2015): the nine conditions of success. For individual stakeholders, this internal interaction is not of significant importance since they apply one policy and consist of one interest group.

Non-state individual stakeholders were roughly distinguished into five groups: NGOs, IGOs, private sector investors, development agencies and civil society. The latter group is up to this day not sufficiently represented in Rwanda and therefore the main focus is on the first four stakeholders. Their influence was measured by applying the study of Ruggerio, Onkila and Kuittinen (2014) who describe the way they can trigger policy development, benefit from policy development and hinder policy development. They were somewhat adjusted to measurements now visible in figure 12. To make ‘trigger’, ‘benefit’ and ‘hinder’ measurable, they all come with two variables that were investigated in this research.

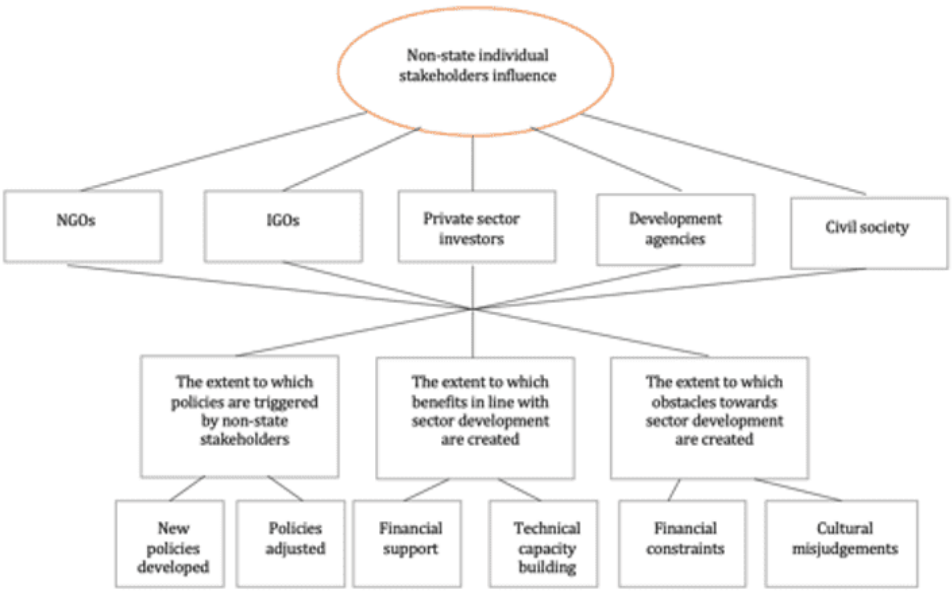


Figure 12 Operationalisation of the Concept 'Non-State Stakeholders Influence'

Partnerships were distinguished into three groups: public partnerships, private partnerships and multi-stakeholder partnerships. Even though public and private partnerships in general consist of more like-minded actors, there is internal interaction that can influence partnership success. The nine conditions for success determined the partnerships' amount of influence on subjects similar as those described in figure 12.

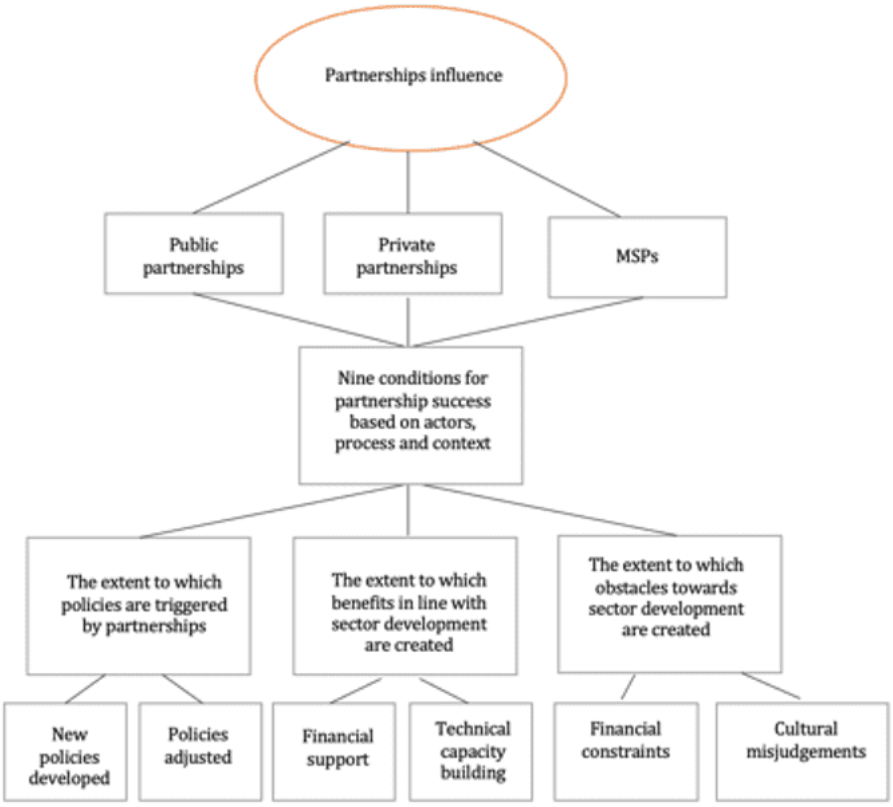


Figure 13 Operationalisation of the Concept 'Partnerships Influence'

4.2 Data Collection

Several qualitative and quantitative methods were used for this research, by using different sources for data collection. This collection was done in a five-month period, between February and June 2020. The first month of data collection occurred in the field, while in the remaining four months data collection was done remotely because of evacuation from Rwanda during the corona crisis. 15 semi-structured and unstructured interviews were held with experts and 108 semi-structured interviews and surveys were conducted with households, with some households interviewed twice when there was an opportunity to discuss both electrification and cooking. Besides these forms of primary data gathering, desk research was done as secondary source.

For the first sub-question, desk research was the main method for data gathering. Energy policy trends were investigated thoroughly, over a period of fifteen years (2005-2020). For clarification of specific shifts in policies and policy trends, the expert interviews were used as extra data sources. The interviews were recorded and transcribed in the programme NVivo. Every expert interview was done with a highly influential actor within the organisation, either being directors, CEOs or country managers. Within the governmental agency REG, the three most influential actors were interviewed, which gives a sufficient view on the opinions on energy development at the national level.

The second sub-question, regarding households' perceptions, relied on the 115 semi-structured interviews and surveys conducted. Respondents were living in two different areas in Rwanda: the urban areas of Kigali and rural areas of the Eastern Province. Households using SHS, improved cookstoves, on-grid electricity and traditional cooking methods were tracked. Semi-structured interviews were used in the cases of SHS and a share of households using improved cookstoves. These interviews were held through the phone, since this was the only option during the COVID-19 crisis. Surveys were conducted through Google Forms and via phone and were used in the cases of on-grid electrification, traditional cooking and improved cookstoves.

The third sub-question concerns the influence of non-state individual stakeholders and uses the semi-structured interviews with experts as main data source. Every interview gave the opportunity to analyse the perspective of each stakeholder in relation to energy policies and sector development. It also created a clear view of which stakeholders were more influential compared to others and why this was the case.

The fourth sub-question uses both primary and secondary data, by desk research and interviewing active partnerships in Rwanda. Partnerships were traced on the SDG partnership platform and by analysing policy documents and websites in which partnerships were mentioned as supportive actors.

Table 2 provides an overview of the specific stakeholders interviewed for this research. Most of these experts were interviewed in the first month and therefore happened face-to-face. 4 of the 15 interviews were done remotely, using online platforms like Zoom and Microsoft Teams.

The household interviews and surveys were all conducted remotely, since this fieldwork was not planned before the outbreak of the COVID-19 crisis.

Table 2 Specifics of experts interviewed

Organisation	Stakeholder	Specifics and number of respondents
Rwanda Energy Group (REG)	Government	1 Managing Director 2 Sub-Sector Directors
European External Action Service (EEAS)	Intergovernmental Organisation	1 Energy Portfolio Manager 1 Head of Infrastructure
African Development Bank	Intergovernmental Organisation	1 Power Engineer
ARC Power	Private Sector	1 Capacity Building Manager 1 Head of Operations
Geni Green Solutions (GGS)	Private Sector	1 CEO
Mobisol	Private Sector	1 Head of Corporate Sales and Government Relations
Mesh Power	Private Sector	1 Country Manager
SNV	NGO	1 Sector Lead and Project Manager
Energy Private Developers	NGO	1 Vice Chairman
Energising Development (EnDev)	Partnership	1 Country Programme Manager 1 Advisor

Table 3 Specifics of households interviewed

Energy source usage	Data gathering	Number of respondents
Solar Home Systems (SHS)	Semi-structured interviews	27 households
Improved Cookstoves	Semi-structured interviews	13 households
Improved cookstoves (ICS)	Survey	25 households
Traditional cooking	Survey	4 households
On-grid electricity	Survey	46 households

5. Rwanda's Past and Present Policy Developments

This chapter answers the first sub-question: 'What policies has the Rwandan government developed to reach universal access to affordable, reliable, sustainable and modern energy?' When discussing 'energy', both the electrification and clean cooking sector were assessed. During the genocide in Rwanda, energy access rates reduced to almost zero percent and made remarkable progress since. Especially the period from 2014 onwards saw exponential increases in electrification rates. However, the clean cooking sector is still struggling in progression.

In the period 1994-2020 electrification rates increased from 0 to 52 percent saw fundamental policy changes. The genocide aftermath resulted in steady increases, however, percentages remained low and show uncertainties in data. The first period of transition occurred from 2008-2012, in which the first extensive national energy strategy was developed and implemented. In the years thereafter, numbers rose to the amount of 15 percent in 2013, but the period in between these years can again be seen as a time of unsure and unreliable data gathering. Numbers fluctuated with approximately five or six percent every one or two years (World Bank, n.d.). From 2013 onwards, a new trend is visible: exponential growth in access to electricity to 34.7 percent in 2018, and 52 percent in 2020 according to REG (REG, 2020). See figure 14 for a trend line.

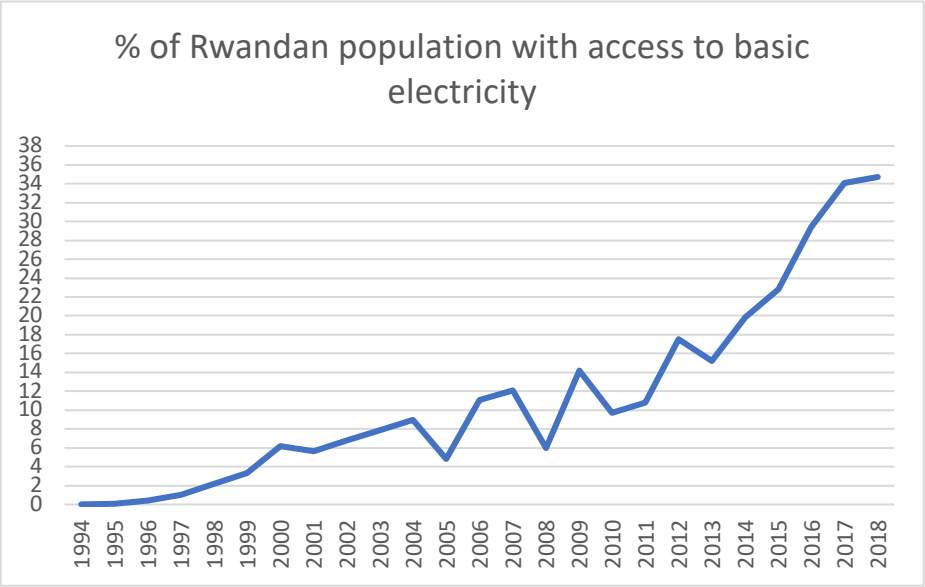


Figure 14 Percentage of total Rwandan population with access to basic electricity, in the period 1994-2018. Based on data World Bank (n.d.).

5.1 Energy Sector Development Take-Off after Fifteen Years of Peace Restoration (2008-2012)

After the 1994 genocide in Rwanda, the first priority of the country was to restore peace, safety and transform the political climate. Access to basic needs in Rwanda remained low. Numbers of clean cooking alternatives have been low since data gathering started in 2000 (World Bank, n.d.), however, these data represent the share of households using clean facilities like LPG and

electricity and do not specify the group using 'cleaner' alternatives, like stoves using firewood and charcoal more efficiently.

Despite the fluctuations in data before 2013, rapid growth trends in access to electricity can be explained by the development of the first National Energy Policy and National Energy Strategy (NEP&NES) to promote sustained growth of the Rwandan economy at the macro level, while at the same time contributing to raising standards of living of the Rwandan people by improving access to energy at the household level (MinInfra, 2009). Compared to previous energy sector policies, the NEP&NES paid more attention to household requirements, new energy sources among which renewables, and private sector cooperation. Even though significant increases in electrification only occurred after 2012, this energy strategy is seen as the base for later successes.

5.1.1 Policy Objectives

The policy objectives within the NEP&NES were: (i) ensuring the availability of reliable and affordable energy supplies for all Rwandans, (ii) encouraging the rational and efficient use of energy and (iii) establishing environmentally sound and sustainable systems of energy production, procurement, transportation, distribution and end-use (MinInfra, 2009). To ensure the availability of reliable and affordable energy supplies, the Rwandan government focused on three main subjects: (i) diversifying sources for energy generation, (ii) reducing losses in energy transmission and distribution and (iii) encouraging competition among energy suppliers. All is done to reach the ambitions for the electricity sub-sector listed below in table 4. The main aim for clean cooking was to reduce the share of total biomass consumption from 84 percent in 2008 to 65 percent in 2020.

5.1.1.1 Domestic Energy Diversification

In 2008, five to six percent of Rwandan households had access to an electricity source and 0.4 percent to clean cooking alternatives. An urban-rural division was visible in electrification rates: respectively 25 percent versus 3 percent. Rural households often live in remote areas and are difficult to reach for the utility company Electrogaz, and besides, connecting households is a costly operation while the returns are low. After all, many households have a yearly electricity consumption of only 30 kWh (IMF, 2008) To compare, an average household in the Netherlands consumed 3500 kWh in 2008. Besides the costly operation of connectivity, electricity was already expensive. Unlike many countries in SSA, Rwanda has limited natural resources. All forms of oil, like LPG and petrol have to be imported. Rwanda's electricity capacity is for only thirteen percent based on own natural resources, namely water. Besides electricity, high costs of fuel for cooking an issue as well. Being used by 99 percent of the population, the inefficient stoves make charcoal expensive and the gathering of wood time consuming.

To diversify sources of energy supply, the Rwandan government focused on the potential of domestic resources and acknowledged the importance of private sector participation or participation of Public Private Partnerships (PPPs) in expanding capacity. They saw most

potential in non-renewable resources: methane[2] and peat[3]. Despite the potential for renewables in Rwanda, the government saw these options as highly expensive. “Rwanda cannot afford the very high pro-renewables tariffs being adopted in some European countries. Renewables incentives will be set at a level appropriate for Rwanda’s circumstances” (MinInfra, 2009, p. 59).

Table 4 Projections of energy demand in the period 2008-2020 Source: MinInfra, 2009, p. 46

	2008	2012	2015	2020
Peak power demand (MW)	55	112	193	360
Energy demand after losses (GWh)	225	460	783	1429
% households with electricity	4.5%	13.4%	23.0%	35.0%
% energy consumed by households	38%	64%	75%	83%

5.1.1.2 Efficient Energy Usage

To ensure that energy is used in an efficient way, the Rwandan government aimed to focus on introducing energy efficient lighting and usage of electricity and on energy efficient use of biomass for cooking. The Rwandan government saw biomass reduction as a priority because of health issues and threats of further deforestation when population would increase. The policy objective was to stimulate the usage of clean cooking alternatives by offering training to local officials and distribute improved stoves in rural areas and shift higher-income households from biomass to LPG (MinInfra, 2009).

5.1.1.3 Strengthening Institutional Capacity

The last objective concerns the strengthening of the institutional capacity of energy management. The Rwandan government acknowledged the fact that there was a lack of human, information technology, and material resources to effectively carrying out designated roles and responsibilities (MinInfra, 2009). Besides this, they highlighted the importance of negotiation skills necessary to become more informed buyers when for example contracts for new energy projects were developed (MinInfra, 2009). Another form of institutional weakness described was the lack of existing laws and regulations that led to chaotic, time consuming and costly procedures for energy sector participants.

To improve the institutional capacity in the energy sector, the Rwandan government proposed a few changes: (i) the appointment of tasks to ministries according to their expertise: MinInfra as the lead responsible for electricity sources (MinInfra, 2009). Controls on biomass exploitation assigned to MinInfra, the Ministry of Agriculture (MinAgri), the Ministry of Local

[2] Lake Kivu, in the Western part of the country, cherishes one of the largest methane quantities in Africa. There is an estimated sixty billion m3 of methane available in Lake Kivu, which could generate around 700 MW. Since Lake Kivu is a shared resource between Rwanda and DRC, this would give Rwanda around 350 MW of potential energy capacity in the lake.

[3] Rwanda has an estimated 155 million tons of peat in the ground (MinInfra, 2009).

Government (MinAloc) and local government authorities. Next to this, many laws and regulations were prepared and adopted regarding electricity, gas, renewable energy and energy efficiency. Capacity building measures were focused on two entities: the government and the public. Government capacity building was done by designing ongoing training to (i) increase expertise on energy project finance and structuring, (ii) to evaluate proposals and acquire skills through recruitment processes and to enter into agreements with the private sector and (iii) to use the opportunities of Rwanda's partners in education to educate Rwandans in energy-related sciences (MinInfra, 2009). The total costs of the 2008-2012 policies are described in table 5.

Table 5 Cost Specification of NEP&NES Policies Implemented between 2008-2012. Source: MinInfra, 2009

Objective	Costs	Percentage
Access to energy	$714 mln	92.4
Diversification	$42 mln	5.4
Electricity costs	$12 mln	1.5
Governance	$5 mln	0.6
Total	**$772 mln**	**100**

5.1.2 Successes and Challenges after the First Timeline

At the end of the period 2008-2012, the results from the energy policies explained in this show both success stories and further challenges. Referring to table 4, the target in 2008 was to reach 13.4 percent of households connected to electricity by 2012. In 2009, this number was adjusted 16 percent, which implied approximately 350.000 households. By 2012, 360.000 households were reached, which meant that the target was met. The target of connecting 100 percent of health and administrative centres and 50 percent of schools was, however, not met. By 2012, respectively 57 percent and 36 percent got connected. The major challenge here was that connectivity occurred through on-grid by the national utility company and the off-grid sector had not commenced yet. Therefore, the aimed cost reductions when private sector activities would increase, were not reached.

There has not been any progress in biomass reduction strategies, as in 2013 the share of biomass as primary energy source remained 85 percent.

The main reasons for the lack in off-grid connections lie with the high dependency of the government on private investors, since they are the only actors involved in off-grid development. One of the shortcomings later admitted is the insufficient involvement of the private sector, which sometimes affected the quality of policy dialogue and engagement of the private sector in implementation (MinEcoFin, 2013). The private sector entities that were operating, lacked sufficient infrastructure themselves, which hampered them from developing a successful business. However, the Rwandan government has made great progress in developing an attractive business climate for private investors, since the World Bank Doing

Business Report[4] 2013 ranked Rwanda on an impressive 32nd place, 22 points higher than the years before. It made Rwanda the highest ranked SSA country that year.

5.2 Rural Electrification and Initial Private Sector Development (2013-2016)

The period 2013-2016 marked the importance of the off-grid rural energy sector with key involvement of local and foreign private sector. Policies were developed in the EDPRS II, a new EARP and a specific Rural Electrification Strategy (RES). The targets of reducing biomass for cooking were mentioned in the EDPRS II and by a report developed by MinInfra and the UN initiative 'Sustainable Energy for All' (SE4All), but biomass reductions did not seem to be a priority area for the Rwandan government. These goals and targets were not specified or practicalised. The period 2013-2016 also showed that the energy sector became a priority even more, which is visible in table 6. Compared to costs dedicated to the energy sector between 2008-2012, diversification of energy generation sources increased enormously and institutional development (governance) disappeared from the budget. It also showed that, while biomass reduction gained first financial attention, electrification was main priority.

Table 6 Allocated budget for Energy Sector Development in Rwanda in the Period 2013-2016. Source: MinInfra, 2015

Objective	Costs in USD	Percentage
Access to electricity	774.6 mln EARP: 727.8 mln Off-grid: 46 mln (by private sector)	24.24
Diversification (expansion electricity generation)	1,647.7 mln	51.56
Biomass reduction	8.1 mln	0.25
Governance	-	
Total	3195.7 mln	76.05

5.2.1 Rural Electrification

A priority area within the EDPRS 2013-2018 and the RES in 2016, was the development of rural areas. What was clear from the document is that the plans for electrification targets are far more ambitious than previously mentioned in the EDPRS I and NEP&NES. Instead of reaching an access rate of 35 percent by 2020, this was revised to 70 percent by 2018 (MinEcoFin, 2013) and 100 percent by 2020 (MinInfra, 2016). The government expected that 52 percent of rural households would be connected to an off-grid source. In 2013, only 4 percent of rural households used some form of electricity, mainly provided through an on-grid connection. Since no off-grid connections were developed until mid-2014, the targets seemed to be too ambitious. However, because of the status of Rwanda in the Doing-Business Ranking, it was expected that foreign and domestic private sector investors would be attracted. This is visible in figure 15, which shows that private investments throughout country sectors were expected

[4] The World Bank Doing Business Reports are based on the 'Ease of Doing Business' ranking, which ranks all countries on multiple indicators measuring the regulatory environment to the starting and operation of a local firm in a specific country (World Bank, 2020).

to increase in worth from approximately 1 billion USD in 2012 to 3.5 billion USD in 2020, compared to public investments worth 500 million USD in 2012 to 1.3 billion USD in 2020.

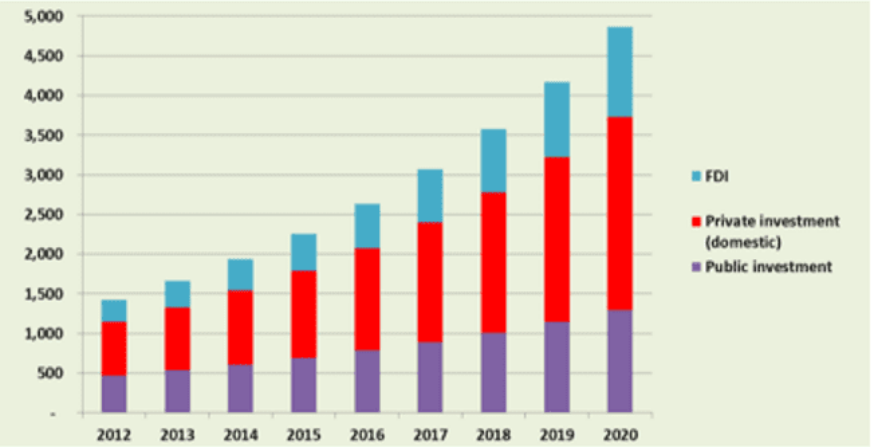


Figure 15 Aimed Investments in Rwanda in USD million to Achieve Vision 2020, Source: MinInfra, 2016

The RES outlined the strategy for the off-grid sector. It extensively described the role of the private sector as a key player in the implementation phase and the possibilities for financial support by the government. The RES was divided into four programmes:

i. Establishment of a mechanism to allow low-income households to access modern energy services through basic solar systems. (MinInfra, 2016).
ii. Establishment of a risk-mitigation facility for the private sector to make sure solar products have an affordable tariff for the target group. At the same time, the solar systems have to be certified by Lighting Global, which drives up costs.
iii. Development of mini-grids by the private sector with a strict overview of the government, that identifies sites for the grids and develops financial frameworks
iv. Government continues to focus on EARP

What was different from the policies developed before 2013, was that the Rwandan government now explicitly focused on off-grid electrification through solar energy, by the distribution of solar lighting systems (SLS) and SHS. The Rwandan government aimed to stimulate the presence of the private sector by reviewing the regulatory environment, importation duties and standards on solar products (MinEcoFin, 2013). At the same time, donors played a vital role in financing MinInfra, or recently privatised REG, which replaced Electrogaz in its existence.[5]

5.2.2 Successes and Persisting Challenges

2018 marks the end of EDPRS II, under which the RES and EARP were established. When summarising the results between 2016 and 2018, it is clear that ambitious targets were not met. However, significant progress was made. The access rate in 2018 was 34.7 percent, a number did not meet the ambition of EDPRS II to reach 70 percent access by 2018 and 100 percent by 2020. Most progress was made in on-grid electrification. However, the off-grid sector has taken

[5] REG is still under the authority of MinInfra as main responsible institution, but has its own budget, board and staff, and policies and regulations.

off since 2014 and reached an access rate of 11 percent by 2018. This has largely been achieved through SHS and to a lesser extent by the recent development of mini-grids. The 11 percent of off-grid customers are often productive users and higher-income households in rural and more remote areas. For low-income households, the systems were still too expensive as there were no subsidy schemes available. What can be concluded from the developments in the electricity sector is that the business climate, the stability and regulatory framework created between 2013 and 2016 helped the energy sector in attracting donors and private companies.

A familiar challenge mentioned in this period is still affordability. Modern off-grid solar systems and mini-grids were expensive to low-income households and there was no sight of subsidies implemented in the short run.[6] There were also no financing or credit systems which could help households making electrification sources more affordable. The last challenge, mentioned earlier as well, was the low consumption rate of many rural households, which was the main reason why there were no plans of REG to connect them to the national grid. Hence, according to the RES, these consumers would require continuous subsidies as the revenue they generate for REG is insufficient to cover the financing and maintenance costs of their connection (MinInfra, 2016).

As discussed before, the progress of biomass reduction was limited and was mainly caused by low financial dedication. The number of households using ICS has not changed significantly and the used ICS do not guarantee high quality levels according to the WHO guidelines. Also, the distribution of LPG or electric stoves in urban areas has not progressed. It is clear that an M&E system is lacking in this sector, as is private sector development. Most private sector developers are interested in designing and distributing high-quality stoves, which are not affordable to most households. Overall, by 2017, 80 percent of the Rwandan households was dependent on firewood as a source for cooking (MinInfra, 2018).

5.3 Universal Access to Electricity and Clean Cooking Alternatives (2017-2024)

What can be seen in the policies developed after 2017 is that the ambitious plans from the Rwandan government have not halted. For the coming years, Rwanda's targets are set to universalise access to electricity to 100 percent by 2024 and to halve the number of households using biomass for cooking by 2024 and reduce this to 0 percent by 2030. 52 percent of the Rwandan population will be connected to an on-grid source, mainly urban households and productive users and 48 percent to an off-grid source, mainly remote rural households. The focus on capacity building again does not return as a priority area. A new ESSP and Biomass Energy Strategy (BES) have been developed to describe targets and means of implementation in the energy sector. The ESSP and BES both highlight the importance of the SDGs and how the policies' targets are in line with the goals.

[6] Mini-grids can cost up to $1500 for each connected consumer, around 50 percent higher than connecting consumers to the national grid (MinInfra, 2016; EnDev, 2018)

Table 7 shows the budget for energy objectives in the period 2018-2024. Compared to table 6, total costs remain equal, however, table 6 describes a timeline of four years, whilst table 7 is seven years. The main difference in table 7 is the increased budget for biomass reduction projects. Besides that, it is expected that more private sector investors are going to invest in the off-grid sector. In table 7, the USD ratio between on-grid budget and off-grid budget is 4.2:1 while in the period 2013-2016 this ratio was 15.8:1. The highest amount of budget is again allocated to diversification, which has caused oversupply of electricity in Rwanda at the moment. The EARP and start of investments in the on- and off-grid sector has increased access to electricity by 2020 to 52 percent, 38 and 14 percent respectively.

Table 7 Allocated budget for Energy Sector Development in Rwanda in the Period 2018-2024. Source: MinInfra, 2018

Objective	Costs in USD	Percentage
Access to electricity	883.6 mln EARP: 673.8 mln Off-grid: 159.8 mln (Private sector)	28.3%
Diversification (expansion electricity generation)	1451.56 mln	46.5%
Biomass reduction	184 mln	5.9%
Governance	-	-
Total	3123.38 mln	80.7%

5.3.1 Changed Ambitions and Launch of Support Systems

Since off-grid connections are planned to be developed by the private sector, the Rwandan government wants to create an ideal enabling environment for companies that are planning to invest in Rwanda's off-grid sector. Therefore, REG is finalising a National Electrification Plan (NEP) which will set out exactly how the access targets will be achieved. The EARP will continue to drive grid connections. Given the high cost per on-grid new connection, approximately 700 USD, development partners' support will be leveraged (MinInfra, 2018). The NEP is visible in figure 16.

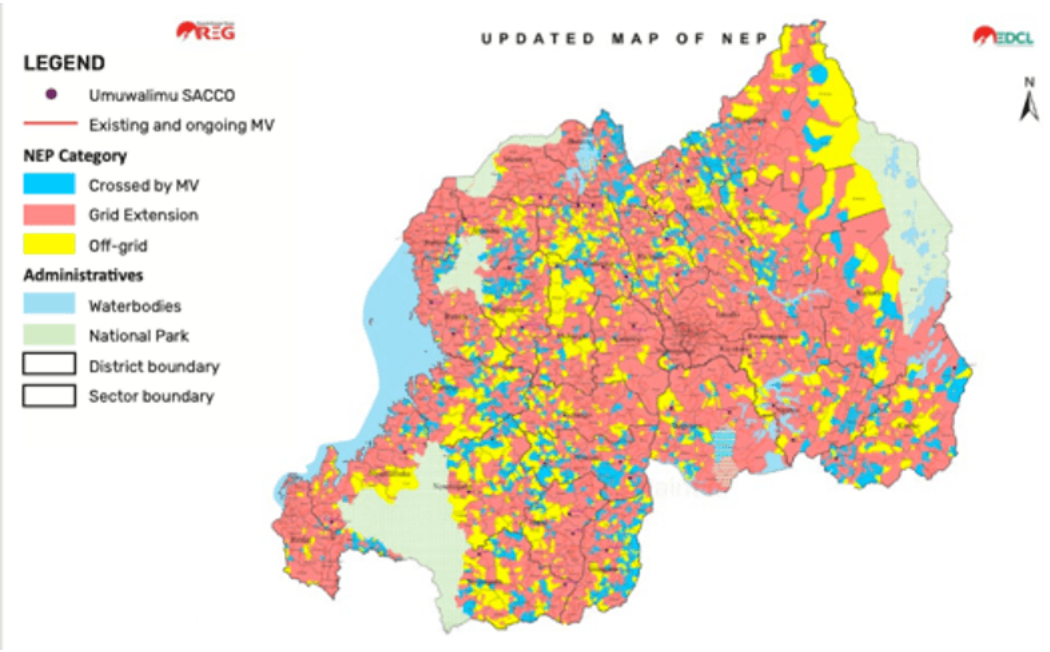


Figure 16 National Electrification Plan. Source: REG, 2018

The yellow spots mark the allowed locations for off-grid electrification, which imply both SHS and mini-grids. In 2018 there were 300,000 households connected to an off-grid source. From 2018 onwards, an average of 250,000 households should be connected each year up until 2024.

Table 8 Energy Sector Strategic Plan for Increase in Access to Energy between 2018-2024. Source: MinInfra, 2018

Connections	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
New off-grid connections	283,507	220,262	271,266	255,706	274,286	293,938
Off-grid access	17%	23%	30%	36%	42%	48%
Households connected (mln)	1.5	1.8	2.3	2.7	3.2	3.7
Share of Households	51.5%	61%	71.5%	81%	90.5%	100%

The government recognises that the high costs for off-grid electrification are an issue.This obstructs the fast acceleration of off-grid connections and hence the government has developed a subsidy scheme based on Ubudehe categories for SHS. Ubudehe categories classify households according to income (security) and job position. The support plans were announced in 2019 but are not in operation yet. The planned scheme can be seen in table 8. This scheme provides high subsidies for especially the poorest households, who are the main target groups for SHS.

Table 9 Planned Targeted Subsidies to Increase the Affordability of Solar Home Systems. Source: MinInfra, 2019

Ubudehe category	Range of subsidy level
Ubudehe 1	80 - 90 %
Ubudehe 2	55 - 65 %
Ubudehe 3	30 - 40 %

5.3.2 Biomass strategy

Dependence on biomass for cooking in Rwanda is still high with 98 percent of the population relying on it. This does not show any differences from the past. Approximately one third of these households use an ICS. Because of the threats to health and environment, MinInfra has developed the BES, in which five points are addressed to reduce the amount of biomass used in Rwanda. The aim is to appeal to the private sector in developing ICS. The private sector will therefore play a major role in reaching the biomass reduction targets described in the ESSP and BES (MinInfra, 2019):

i. Improve sustainable management of biomass through improved wood biomass resources and increase of tree density in agroforestry/crop areas
ii. Halve the number of households depending on firewood as a source of energy for cooking from 79.9 percent (2016/17) to 42 percent by 2024. Efforts will be concentrated on promoting use of cooking gas in urban areas.
iii. Reduce the consumption of wood by urban households through: (a) switching to primarily LPG, (b) replacing traditional charcoal with improved charcoal technologies and pellets and (c) dissemination of highly efficient wood stoves in peri-urban area
iv. Improve efficiency of biomass usage by rural households by: (a) strengthening pellets gasifier and briquettes value chains and (b) increasing penetration of high efficiency ICS for firewood.
v. Strengthen coordination and capacity building and M&E to effectively manage the biomass energy sector.

The share of households using an ICS as their primary source for cooking has to increase with approximately 300,000. Table 9 shows the plans described in the ESSP of disseminating stoves in numbers per year.

Table 10 Targets for Modern Cooking Technologies Uptake by Households in Rwanda between 2018-2024. Source: MinInfra, 2018

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Households using firewood	83%	74.8%	66.6%	58.4%	50.2%	42%
Households using alternative fuels	542,177	835,368	1,150,858	1,489,985	1,854,094	2,244,642
Households moved off firewood	137,219	293,191	315,490	339,127	364,109	390,548

As stated in the ESSP (MinInfra, 2018, p.62-63):

> The private sector will play a prominent role in delivering access to clean cooking technologies. The government will engage with the private sector and promote investments through establishing an enabling environment. Barriers to entry and bottlenecks will be identified and reduced or removed, resulting in competition and innovation in both technologies and business models.

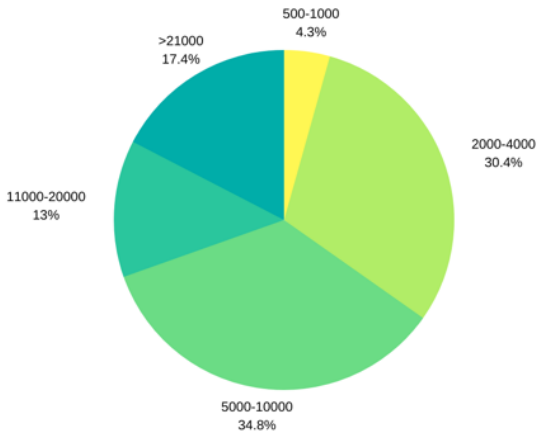
Reducing the proportion of households using firewood as a fuel for cooking will be achieved through a combination of government, development partner and private sector funding. As with off-grid electrification, for higher-income households, the private sector will be able to operate commercially. However, lower-income households will require support.

6. Households' Perception of Materialisation of Rwandan Energy Policies

This chapter describes the perception of Rwandan households of the materialisation of energy policies. Almost half of the Rwandan population will become connected to an off-grid electricity source by 2024 and the number of households using traditional stoves with biomass fuels has to be halved by 2024 while it should be zero by 2030. For the on-grid sector the government devotes large budgets to the expansion of generation, transmission and distribution networks that have to be realised with the support of large private investors and development partners. The off-grid expansion is the complete responsibility of private sector investors who are willing to develop a business in SHS, mini-grids and ICS. The overall perception of consumer households is that especially off-grid electricity is seen as a welcome intermediate step, but that an on-grid connection has the highest value and is perceived as the ultimate source of electricity connection. For ICS, the alternatives are accepted, as long as they are affordable, which is often not the case.

6.1 On-grid Electricity Experiences

The majority of respondents (N=46) spent 5000 RWF[7] or more per month on electricity (65.2 percent of respondents). Approximately one third of the respondents spent between 2000-4000 RWF per month (30.4 percent). 82.6 percent found the average costs per month affordable, of which some respondents marked that sometimes, mainly in peak hours or after heightened kWh prices, they found it less affordable.



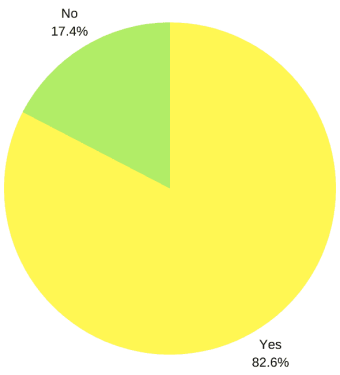
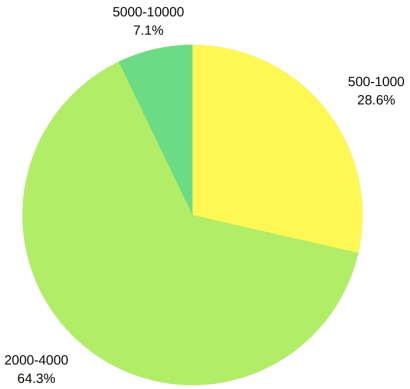


Figure 17 Average Costs in RWF for On-Grid Electricity per Month (N=46).
Figure 18 Question of Affordability of On-Grid Electricity per Month (N=46).

Comparing the results above to the results from the phone interviews in figures 19 and 20 (N=14), the costs of survey respondents on average is higher. As explained before, the respondents using the online form are considered higher-income groups. The households from the phone interviews lived in rural areas and used the electricity mainly for lighting, charging, radio and TV and did not use advanced devices like fridges, irons, laptops etc. However, what

[7] The current exchange rate of 1 RWF is $0.0010. 5000 RWF = $5.24 (August 2020)

can be seen below is that the majority, 78.6 percent of the respondents found the costs affordable. The households answering 'no', lived in rented houses owned by a landlord categorised higher in the Ubudehe ranking. Because the cash power system of the tenants was registered on the name of the landlord, the tenants had to pay according to the Ubudehe category of the landlord, instead of their own category. This makes the electricity relatively expensive compared to the economic situation of the tenant, which creates an equality imbalance between those households able to afford a house and those not able to afford it.



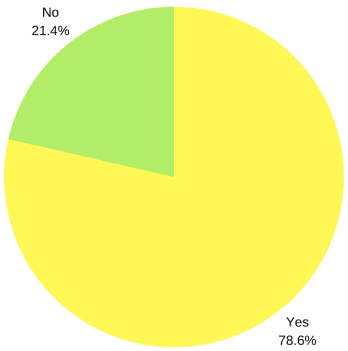
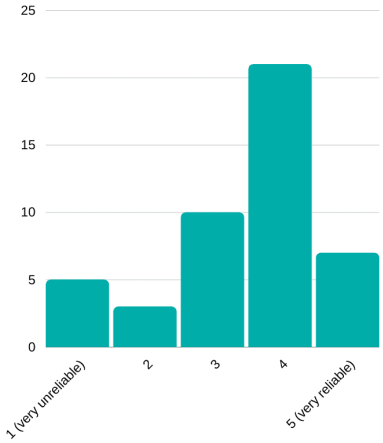


Figure 19 Average Costs in RWF for On-Grid Electricity per Month (N=14).
Figure 20 Question of Affordability of On-Grid Electricity per Month (N=14).

Besides the question of affordability, the overall satisfaction of having an on-grid electricity connection is high. This satisfaction can be identified according to perception of reliability, service delivery of the utility company and new possibilities electricity brings to households. In the online survey, 28 out of 46 respondents found reliability always good or excellent. The respondents answering that the connection was unreliable blamed this on the many power cuts per day or per week, especially in the rainy season. In the phonetic interviews, 5 out of 14 respondents mentioned the problems of power cuts in the rainy seasons as well. The service delivery of REG was perceived good, with 26 out of 46 respondents of the online survey ranking the service good or excellent.[8] 7 found the service not satisfactory or even disappointing. Respondents perceiving service as 'good' or 'excellent' mention the decent service via mobile phone and the quick service delivery on site. On the contrary, the seven respondents being unsatisfied, blamed REG not being reachable by phone or not having enough skilled technicians being able to fix the problems of customers.

[8] During the 14 phonetic interviews, the question regarding service delivery was not asked.



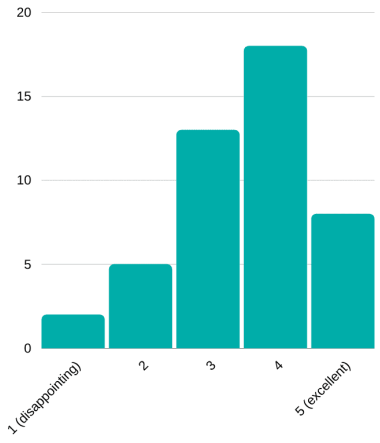


Figure 21 Perceived Reliability of On-Grid Electricity Connection (N=46).
Figure 22 Perceived Quality of Service Delivery by the Utility Company (N=46).

So, besides some complaints about service and challenges considering power cuts in rainy seasons, the overall satisfaction rate is high. Having access to on-grid electricity is the most valued and most wanted form of electricity, which will also become clear in the next sub-chapter discussing off-grid electricity access. Table 11 shows a few quotes from the interviews concerning the satisfaction and opportunities on-grid electricity has brought households in Rwanda.

Table 11 Quotes Regarding Perceived Experiences with On-Grid Electricity based on Phonetic Interviews among Households (PIHH)

PIHH2	The connection helped us to start small businesses, like boutiques and hair salons
PIHH5	My children are able to resume their studies during the night and do their homework easily. We are able to cook at any moment, because we do not have to rush to get it done by darkness anymore
PIHH7	I would say that electricity has helped to improve the level of security, because before there were some places where you should not be during the night because of the darkness.
PIHH12	The area where I live in Kigali, Bumbogo, was less developed ten years ago. Today, a lot of development activities have been established, including electricity. Now we all have small businesses which helped develop the area.
PIHH13	Everyone in the country should get connected, especially those in rural areas since electricity is one of the key sources for development.

6.2 Off-grid Electricity Experiences

To discover the perception of households connected to an off-grid electricity source, 26 households from Eastern province using a SHS were interviewed phonetically. All respondents used a Mobisol SHS, which is a relatively expensive and advanced product kit containing several lightings, chargers, a TV and an electric shaver for hairdressers. An average Mobisol SHS is worth 800,000 RWF and when paying in instalments, a minimum amount of 24,000 RWF per month is required over a total of three years (Mobisol, n.d.). This already indicates

that the average monthly costs of a SHS are much higher the first years than a grid connection. The five most important findings in this sub-chapter are:

i. SHS kits are expensive and at the moment not affordable to many households, especially those in rural areas
ii. During the rainy season between March and May, there is hardly any power from the SHS
iii. SHS have low battery storage capacity, which results in fewer hours of crucial electricity usage during peak hours (at night) than during the day
iv. Average SHS have low wattage, which means that productive usage is not possible. This obstructs households from starting businesses and other means of productive usage
v. Because productive usage is not possible in off-grid assigned areas using SHS, the distance for households to find productive users like hairdressers, milk centres etc. can be very long.

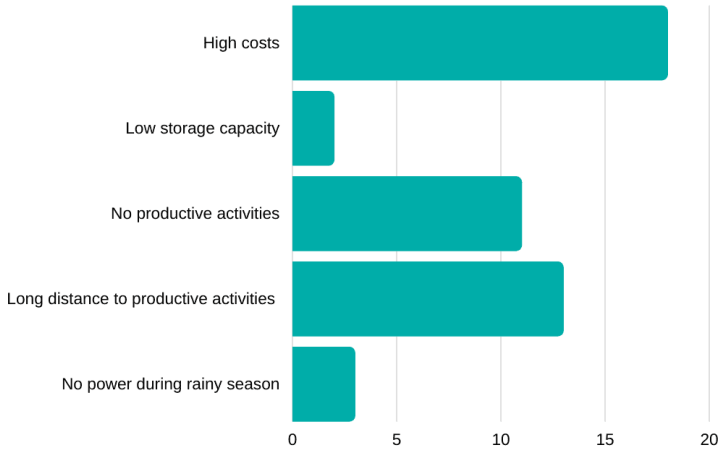


Figure 23 Perceived Obstacles for Households Using SHS as Electricity Source (N=26)

Figure 23 is based on statements explicitly made by respondents. What can be seen is that especially the costs, the lack of opportunities for productive activities and the long distance to reach productive activities, are the main complaints of SHS respondents. Every respondent had at least one complaint, which was one of the five above-stated subjects.

Referring to figure 24, 14 out of 26 households were asked about the distance they had to travel to the closest location providing productive services (N=14). 9 of them had to travel for more than 30 minutes before being able to charge a phone or reach the hairdresser. 6 out of 14 had to travel 45 minutes or more. This shows that the development of productive activities, which stimulates the local market, remains limited in off-grid electricity areas.

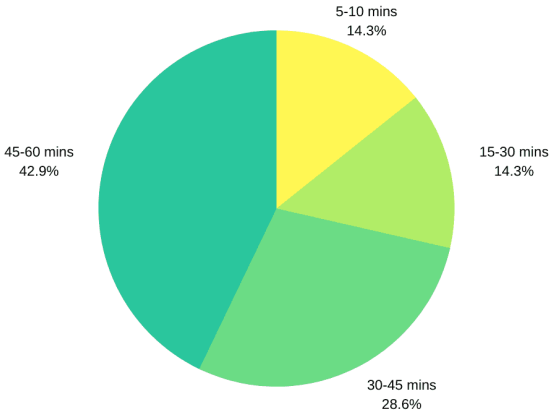


Figure 24 Travelling Distance to the Closest Location Providing Productive Services (N=14)

Half of the respondents who described complaints, wished to be connected to the national grid soon because this would solve the problems mentioned in figure 24. They see the SHS as a temporary solution, which is only affordable to households with higher incomes, since there are no subsidies for the lower-income groups yet. This makes it more difficult for lower-income groups to afford a SHS. Another problem is that the Rwandan government has the aim to connect 48 percent of the population to an off-grid source, which implies connecting almost 6 million Rwandans either to a SHS or mini-grid by 2024 and also includes the low-income groups whom are the hardest to reach with expensive SHS. Table 12 lines out some quotes from the interviews with SHS users.

Table 12 Quotes Regarding Perceived Experiences with SHS based on Phonetic Interviews among Households (PIHH)

PIHH17	SACCO, the local savings and loans bank, helped me to buy my own SHS kit
PIHH21	The TV I obtained from the SHS kit does not last for long at light. My aim was to show football matches in the village to earn some more income, but it appeared impossible
PIHH23	The government should help us with getting power from the utility company instead of connecting us to SHS
PIHH26	My SHS is a back-up solution, because there is no reserve power in the SHS which would be necessary in the rainy season when we do not have power
PIHH27	New systems should be developed for low-income groups, because they cannot afford the expensive SHS
PIHH37	A lot has been done in ten years, because then there were no SHS at all and we did not have lighting, so that is an improvement
PIHH41	We travel long to get other services like charging our phone.

6.3 ICS Experiences

To become aware of the experiences among households regarding ICS usage, a total of 29 households (N=29) were questioned through phonetic surveys. 14 used a wood-based ICS, 11 used a charcoal-based ICS and 4 used traditional cookstoves, in this case a three-stone stove

using wood as cooking fuel. Figure 26 shows the distribution of cookstoves among questioned households. The charcoal-based ICS users lived in Kigali, while the other 18 lived in Eastern Province in rural areas. The most important findings for this sub-chapter are:

i. Charcoal-based ICS users were all satisfied with their way of cooking, while less than half of wood-based ICS users was satisfied and no traditional stove users were satisfied
ii. Of the users wishing to obtain another cookstove in the future, the most desired fuel was LPG or biogas
iii. Charcoal-based ICS are exponentially more expensive than wood-based ICS and are therefore less suitable for low-income households.
iv. Charcoal-based ICS require the availability of a market selling charcoal, which makes them less suitable than wood-based ICS for remote households
v. Urban households were often already aware of the existence of ICS, while creation of awareness by local authorities was necessary in rural areas.

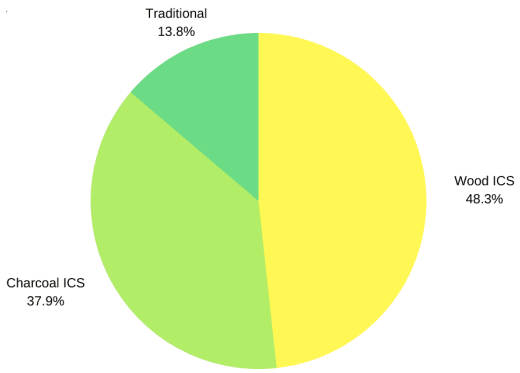
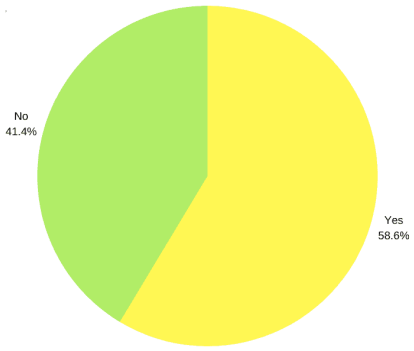


Figure 25 Distribution of Cookstoves among Questioned Households (N=29)

Looking at figure 26, it shows that 58.6 percent of respondents was satisfied with the used stoves. Remarkable is that all 11 charcoal-based ICS users were satisfied with their stoves, while only 6 out of 14 wood-based ICS users were satisfied, and no traditional stove users were satisfied. The main reasons for dissatisfaction were the continuation of wood consumption with an ICS, because wood has become more difficult to find over the years. The unsatisfied households described the expensiveness of wood on the market and the desire to switch to cleaner fuels like LPG or biogas because of the health issues created by burned wood. However, the usage of especially LPG is much more expensive than wood. In this case desire and actual economic feasibility do not correspond.



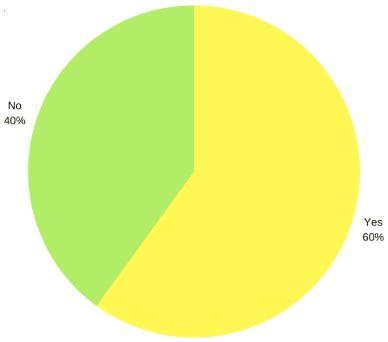


Figure 26 Question of Satisfaction with Used Stove (N=29).
Figure 27 Question of Affordability of Used Stove (N=25).

Figure 27 describes the degree of affordability of the used stove. This question was not asked to traditional stove users. 60 percent of respondents thought their stove was affordable to their economic situation. 6 of them were charcoal-based users and 9 were wood-based ICS users. To clarify; the charcoal-based ICS costs 18,000 RWF, while the wood-based ICS costs 2,000 RWF. Three of the charcoal-based ICS users mentioned the fact that the stove was affordable to their economic situation, however, they stated that the stove is probably too expensive for many other households. The households stating it was not affordable had to save up before they could buy one, or they found the quality/price ratio out of balance. The five wood-based ICS users who found their stove not affordable, mentioned especially the costs of wood on the market and not necessarily the purchase costs of the stove. Because this group of households has a low income and finds it difficult to pay for wood, their situation will create the most challenges for the government that aims to reduce biomass stove users to zero percent in 2030.

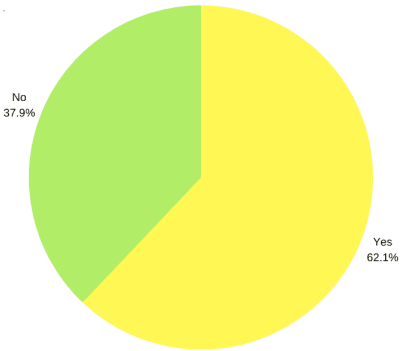
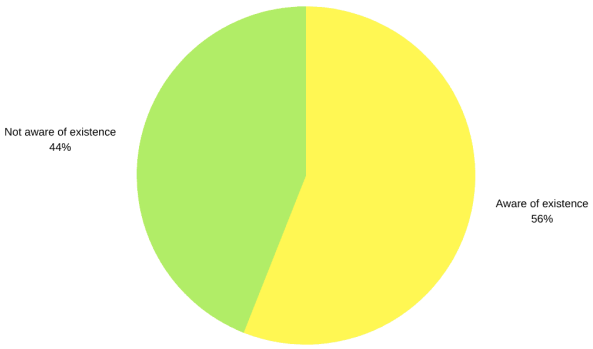


Figure 28 Question of Changing the Current Way of Cooking in the Future (N=29)

When looking at figure 28, it becomes clear that a majority prefers to change the way of cooking in the future. Especially the wood-based ICS and traditional stove users would like to change their way of cooking in the future. 9 out of 11 wood-based ICS users mention the negative sides of using wood and would like to use other fuels, like LPG or biogas. The other two prefer more

efficient wood-based ICS. 3 out of 4 traditional stove users want to switch from using wood as well and again mention the expensiveness and scarcity of wood.



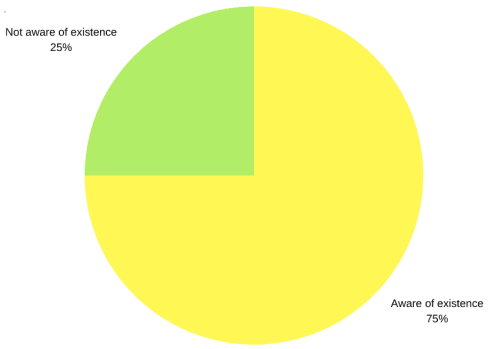


Figure 29 Households Being Aware of the Existence of ICS before Usage of Current ICS (N=25)
Figure 30 Households Being Aware of Existence of ICS at the Moment (N=4)

Figure 29 and 30 show the question of awareness by current ICS users and traditional stove users. All eleven charcoal-based ICS users were already aware of the existence of ICS before they purchased one because of familiarity with ICS used by neighbours or friends. 11 out of 14 wood-based ICS users were not aware of the existence of ICS before they purchased one. 10 out of 11 became familiar with ICS after local authorities came to the neighbourhood to make the households aware of the benefits.

To conclude this sub-chapter, it is clear that households would almost all prefer an ICS based on LPG or biogas, or at least an ICS not based on wood. The main challenge here is affordability of those types of stoves, since many wood-based ICS users can hardly afford wood let alone charcoal or LPG. What can also be concluded is that the local authorities are organising awareness-raising campaigns to help households switch to ICS. What remains an issue here is that low-income households are clearly not able to afford modern stoves, which creates a challenge for both the government and private investors when designing feasible and financially healthy mechanisms to help all households switch to ICS in the coming ten years. Table 13 lines out a few quotes derived from the phonetic surveys among ICS and traditional stove users.

Table 13 Quotes Regarding Perceived Experiences with Stove Usage based on Phonetic Interviews among Households (PIHH)

PIHH43	Traditional stove user	Getting woods is very expensive and personally, using wood affects my house. Every three years I have to change to roof above my kitchen
PIHH45	Traditional stove user	I think other ways of cooking are more helpful and have less effect on our health. However, I do have a problem with financial abilities and the stoves are not easily accessible here
PIHH53	Wood-based ICS user	I am looking forward to having an alternative stove that uses another source of fuel instead of wood.
PIHH54	Wood-based ICS user	My stove is helpful compared to the previous way of cooking (three stone stove). However, it still uses wood which is difficult because it is expensive. When you do not have children to fetch them for you, you really struggle
PIHH64	Charcoal-based ICS user	Considering my financial ability, I am satisfied with my stove. Maybe in the future, once I reach another level of income, I would like to buy gas or an electric stove.
PIHH67	Charcoal-based ICS user	Not all households can afford the charcoal-based stove I use, so I would suggest that more categories of stoves must be produced if we want to stop using traditional stoves.
PIHH70	Charcoal-based ICS user	I am satisfied with my stove because it saves charcoal, it does not leave a mess from where you cook, and it cannot break easily.

7. Stakeholder Influence in the Energy Sector in Rwanda

This chapter describes the influence of stakeholders on the development of the energy sector in Rwanda. It leaves the involvement of partnerships to the next chapter, as this creates a desired division between the two entities and makes it easier to compare them in the discussion's section. This chapter is mainly based on the information given by experts in the energy field in Rwanda who are specifically involved in a part of the energy sector situation. It describes the interaction between different stakeholders and to what extent these stakeholders – especially the non-state stakeholders – contribute to the gap between developed governmental policies (chapter 5) and the perception of households regarding the materialisation of these policies (chapter 6).

7.1 Identification of stakeholders

As described in chapter 5, the number of stakeholders in the Rwandan energy sector has increased since there has been more focus on private sector investors. While governmental bodies are generally identified as the most influential players - with the assigned authority to design and adjust policies, set targets and therefore being ultimately responsible for actions – there has been a growing presence of private sector entities, governmental and non-governmental development partners, governmental and consumers.

The results in this section show that stakeholders have an essential influence on energy sector development in Rwanda, however, there is a difference in the amount and kind of influence. To make the results and comparison between stakeholders more feasible, there are four distinct sub-groups recognised that represent a collection of individual stakeholders, namely: national energy bodies, development organisations, private sector actors, and consumers. A list of relevant stakeholders in the Rwandan energy sector can be observed in table 14. The green-marked stakeholders have been interviewed to get a detailed insight into the ranking of influential and less influential stakeholders, and what the exact influence entails.

Table 14 Overview of Relevant Stakeholders in the Rwandan Energy Sector

Governmental bodies	Development Organisations	Private sector actors	Consumer groups
Ministry of Economics and Finance	African Development Bank	ARC Power	On-grid connected households
Ministry of Infrastructure	European Union	BBoxx	SHS-connected households
Rwanda Energy Group	GIZ/EnDev	Contour Global	Mini-grid connected households
Rwanda Utilities Regulatory Authority	Power Africa/USAID	Geni Green Solutions	Not-connected households
	SNV	Hakan	Households using ICS
	World Bank	Ignite	Households using traditional cookstoves
		Inyenyeri	On-grid connected productive users
		Mesh Power	Off-grid connected productive users
		Mobisol	Productive users using ICS
		NOTS	Productive users using traditional cooking measures
		SO Energy	
		Symbion	

7.2 Public Sector Actors

The public sector actors are divided into two groups: policymakers shaping the enabling environment and policy implementers. The policymakers are the Ministry of Finance and Economic Planning (MinEcoFin) and (MinInfra). MinEcoFin allocates the budget for energy investments and operations and MinInfra develops energy policies and targets. Subsequently, policies are implemented by REG and RURA. RURA sets the tariffs for energy prices in Rwanda, which are set in policies but can be adapted to economic circumstances.

7.2.1 Policymakers

MinEcoFin and MinInfra have developed policies over the years that help to stimulate the electrification and ICS usage. Most of the time, the policymakers have been supportive stakeholders to the electricity sector in Rwanda, since their efforts have had a positive impact on access rates. Especially the business climate has been mentioned to have a positive influence on the increased access rate in Rwanda. Besides, since the Rwandan government has had high ambitions regarding the universalisation of energy access during the past twelve years, certainty regarding government policies regarding public support in energy development has been high. This implies that previous and current energy policies have not had a negative impact on investments of the private sector and support packages of development organisations.

"There is a well-established regulatory and business environment in Rwanda, which stimulates the incentives for companies to start a business in Solar Home Systems or mini-grids" (P. Cooke & C. Wilkinson, Personal Communication, 26 March 2020).

However, the policymakers have also been hindering the access process, since no planned subsidy schemes and other funding mechanisms have been operational yet. From the expert interviews it has become clear that funding or subsidy schemes are extremely important because the expensive off-grid electricity sources are hardly affordable to many target groups, which are often the lowest-income groups in remote, rural areas. Besides, the policymakers have been hindering other stakeholders from operating successfully in the country after strict regulations for SHS were adopted last year.

Every part of the country appears in the National Electrification Plan. The country is divided in a way that they will be connected either off-grid or on-grid. In some of those areas there are specific sites for mini-grids. The government is aware that the tariff for this is quite high and the government is looking for a way in which the tariffs for this can be reduced, to help make sure that all people can afford the type of energy source that is planned to come in their district. The government is willing to discuss the tariff for off-grid as they are aware about this challenge of high cost (F. Gakuba, REG, Personal Communication, 9 March 2020).

"Rwanda is behind targets, and the reason lies with the government. For Solar Home Systems, the government imposed a whole new set of guidelines and none of the existing companies in Rwanda met these guidelines, however, their products do meet the Lighting Global standards. So, all of a sudden this imposed a big halt on operations because import of products was not possible anymore" (J. Roberts, Mesh Power, Personal Communication, 23 June 2020).

In terms of regulatory and business environment, implemented by RURA, there are fiscal and non-fiscal incentives to attract businesses to Rwanda to invest in the energy sector. A selection of incentives is described in table 15.

Table 15 Fiscal and Non-Fiscal Incentives for New Businesses Investing in the Rwandan Energy Sector. Source: Rwanda Development Board, 2020

Fiscal incentives	Non-fiscal incentives
Zero corporate income tax for companies planning to relocate headquarters to Rwanda	Free repatriation of capital and assets
Seven-year corporate income tax holiday for projects over $50 million in energy once generated 25 MW and above	Quick business and investment online registration
Accelerated depreciation rate of 50 percent for the first year in key priority sectors, including energy	Provision of aftercare services to fast track project implementation

7.2.2 Policy Implementers

Regarding the policy implementers on public sector level, REG and to a lesser extent RURA are the most prominent players and support non-state stakeholders, however, there are also signs of hindering them.

To make the possibilities for energy development in Rwanda more specific, REG has designed the NEP which has been explained already in figure 16 in chapter 5. This map makes it easy for companies to see where they can operate their business and where they cannot. The NEP is the leading scheme for stakeholders developing the electricity sector in Rwanda. Half of all interviewed businesses, NGOs and development organisations mentioned the NEP explicitly as the policy plan that has to be followed when thinking about stimulating the off-grid electricity sector in the country. It creates an incentive for investors and development organisations to search for target groups very specifically and investigate feasible sites for operations. However, the plan has seen some adjustments in the past, which makes the plan less secure than often is assumed. Especially for off-grid operators this implies that their developments done in certain areas can become irrelevant when the government decides to extend the on-grid areas in these specific, previously marked off-grid, areas. Besides, what will happen after 2024 is unknown, whether the government will then aim to connect everyone to the national grid or not. This will satisfy the Rwandan population but will at the same time influence private businesses in off-grid electrification in a negative way, which sometimes halts private investors from executing large-scale and costly investments.

> The government has established the National Electrification Plan, which clearly shows where solar home systems and mini grids can be established. This map has changed somewhat over the years, but we never experienced major issues in this matter. However, it is still a risk, because the plan can change again in the future (P. Cooke & C. Wilkinson, ARC Power, Personal Communication, 26 March 2020).

> "One needs to carefully check the National Electrification Plan and make sure that one's business model will allow one to make profit in a given area that is planned to be off-grid" (A. Munyehirwe, Geni Green Solutions, Personal Communication, 17 March 2020).

Both policymakers and implementers show willingness to cooperate and involve stakeholders in discussions regarding policy and advice. On the one hand, this shows support created by the government towards investors instead of making decisions alone, on the other hand the government realises that it cannot achieve its goals and targets without the private sector and also NGOs and development organisations. Another, very important, stakeholder group is the consumer group, which roughly exists of productive users and households. Since households are the ones mainly targeted by off-grid electricity sources and ICS, the focus here is on households as well. Hence, no productive users were interviewed.

According to expert and household interviews, the government's level of cooperation depends on the crucial position of other stakeholders; put differently, the level of dependency of the government on other entities. This can be based on financial, technical and political dependence. Financial dependence most often comes from development organisations like the EU, World Bank and African Development Bank (AfDB) who support the Rwandan government with millions of dollars each year to develop the energy sector in order to achieve the aimed goals of the government (REG, 2020).

7.3 Non-Profit Development Organisations

The non-profit development organisations have been present in Rwanda for decades now and since the government's focus on energy development has been rising in the country, many organisations have used this window of opportunity to devote more attention to this sector. 'Attention' here implies budget support to the government or private investors in the energy sector and advice and advocacy on policy level. It has to be said that these two forms of attention cannot completely be seen separately, since an advocacy or advisory position for development organisations at policy level is difficult without positively contributing to financial constraints the government has. Exceptions are there when organisations provide advice to a governmental body which identifies their support as crucial. This can for example be technical advice or support. Moreover, it is clear that the Rwandan government cannot operate without the support of its development partners, which puts these organisations in a powerful position. Besides the support described below, development organisations can hinder energy development in Rwanda because of the strict measures in some finance mechanisms towards the government and the private sector.

> "In the implementation of projects, REG is working with different partners like the EU and AfDB. Half of the budget for energy projects is coming from the Rwandan government at the moment; the rest is coming from development partners" (F. Gakuba, REG, Personal Communication, 9 March 2020).

Despite the shared goal of stimulating the energy sector in Rwanda, the cooperation mechanisms of development organisations vary. This can especially be identified in the character of budget support: grants vs. loans. When an organisation provides a grant to the Rwandan government or to a private investor, the there is no requirement to refund the finances.

For a government in a developing country, it creates to opportunity to not being stuck to debts with an interest rate that have to be refunded in the future. A grant is given to a government or a specific earmarked project, however, once the money has been transferred, the receiver has the freedom to decide how the money is spent. A grant is less restricting than a loan.

> A grant, which we call sector budget support, means that you have no actual means to control the money used. You cannot detect every million that you send and how it is spend exactly in the energy sector. Having said that, the government likes it because it gives them a lot of flexibility (M. Pedretti, EU EEAS, Personal Communication, 11 June 2020).

As stated, the Rwandan government values the opportunity organisations like the EU give them with the provision of grants, instead of loans. That, in combination with the amount of money granted to the energy sector, gives organisations like the EU a position at the policy table: "As a donor providing grants, not loans, we are the biggest one. This is a position where we can set up a policy dialogue with the government, which is strong" (M. Pedretti, EU EEAS, Personal Communication, 11 June 2020).

Organisations like the World Bank and AfDB provide the Rwandan government and energy sector projects with loans, which, according to the EU, are less attractive financing mechanism than the provision of grants. However, there is no clear evidence that organisations like the former two have fewer opportunities to influence policy dialogues because of the budget mechanism used. What is relevant in this matter, is that for example the World Bank is the biggest loan provider in Rwanda and creates a powerful position too, since the Rwandan government and private investors are highly dependent on their funding.

Besides the support through funding, there is support through for example technical capacity building among local authorities and local private sector investors. NGOs, like SNV, do not provide the Rwandan government with funding but focus on the practical implementation and materialisation of governmental policies. Since this also helps the Rwandan government reach its targets, it creates dependence on SNV.

> "We reach out to cooperatives and private investors to help create a market in clean cooking alternatives and to help expand the businesses. All technologies are welcome, but clients should have a choice and need to be able to invest according to convenience and purchasing power" (A. Ndahimana, SNV, Personal Communication, 24 February 2020).

7.4 Private Sector Actors

Since 2008, the role of the private sector has been growing. All sectors, on-grid and off-grid electrification and to a lesser extent the distribution of ICS have seen a significant rise of private sector actors involved. The plan of the Rwandan government is to further increase their

involvement in the future. Most private sector actors investing in the energy sector are from outside Rwanda and more specifically, from European and North American base. Most companies with headquarters in Rwanda are also led by foreign, often Western, managers and directors. There is a small group of companies founded in Rwanda, but there is no clear information whether this group increased or is going to increase in the future.

Most private sector actors are a member of Energy Private Developers (EPD), which is the sector organisation that represents all private investors in the energy sector in policy dialogues and that supports companies in financial, technical and other business matters. They advocate for companies under the EPD platform and try to influence new policymaking or the adjustment of current policies.

Private sector actors support the sector by turning policy into practice: increasing the access rates to electricity and ICS. “Supporting the government in reaching its 2024 goals on universal energy access” (L. Rwagaju, Mobisol, Personal Communication, 3 March 2020). For example, Mobisol has connected 35,000 households to a SHS since 2014. Like Mobisol, other companies in the off-grid electricity and ICS sector support the usage of renewable energy sources. For off-grid electricity this implies increased usage of water and solar and for ICS the more efficient usage of biomass by a reduced usage of traditional biomass and the introduction of pellets and briquettes. An example of a company distributing ICS is Geni Green Solutions (GGS): “GGS ltd. is the leading producer and distributor of ICS. GGS has almost 6000 customers around the country. GGS’s goal is to reach 0.5 million households in the next five years with ICS” (A. Munyehirwe, GGS, Personal Communication, 17 March 2020).

The on-grid sector has the largest share in increased access to electricity, however, the share of renewable sources used in the on-grid sector is low. Most private investors have set up plants generating methane gas and peat into electricity. Even though hydro power is the largest electricity generation source, there is a large increase in non-renewable sources noticeable.

Another form of support is the technical advice given to governmental institutions. Companies sell different kinds of products, like SHS, mini-grids and ICS, but no product is the same. Some SHS companies sell basic kits, other sell more advanced kits. Some mini-grid developers sell more basic, less expensive electricity generated through more basic grids than others or distribute basic packages for free to support the lowest-income households. For ICS, some use charcoal or wood and some use pellets and briquettes, or LPG. The different investors advise the government on these matters individually or through EPD. These companies can be supportive to the government because of the skills and competencies they have, which is often the reason why the majority of employees in managing or technical positions come from abroad, and more specifically from European and North American countries. Skills that are currently lacking in Rwanda.

"We are seen as a quite well-respected company from the technology side, from the government's perspective. If we come to the table with a proposal or something, they often agree on technical aspects" (J. Roberts, Mesh Power, Personal Communication, 23 June 2020).

The last aspect of support by the private sector is creating awareness. Connections to the national grid are seen as the highest desired good and hardly anyone will oppose against the arrival of the grid. The national grid has a positive name in most areas in Rwanda and therefore Rwandan households require more information on the possibilities of off-grid sources.

Before a company starts its operation, it is necessary to make sure potential consumers are informed about a new technology. In the electricity sector it has been perceived necessary that consumers understand that off-grid sources can be strong, reliable sources that increase the quality of life. In the ICS sector, habits are an important factor to influence. In Rwanda and in many other SSA countries, many households gather fuel for cooking and hence do not pay for it. The introduction of ICS makes these households shift from cooking for free to paying money for cooking. Hence, companies like GGS, founded in Rwanda and managed by Rwandans, understand this issue and therefore provide households with ICS efficiently using wood or charcoal. This saves time and effort for the households gathering fuel, which saves more time for other means and it is economically feasible because these stoves are much cheaper than the more advanced, but also cleaner stoves.

"Many people in rural areas don't pay for their cooking fuel, they gather it. You cannot just oblige them to pay for fuel all of a sudden. This is not a solution" (M. Pedretti, EU EEAS, Personal Communication, 11 June 2020).

"In cooking, you should understand the Rwandan habit of cooking and try to adapt your technology in relation to that habit" (A. Munyehirwe, GGS, Personal Communication, 17 March 2020).

The major aspects in which the private sector can hinder the development of the energy sector in Rwanda are finance and cultural feasibility. Most off-grid products are innovative and therefore expensive to low-income households. Even though most companies work with a Pay-as-you-go system or payments in instalments, these costs are often still too high. As a result, many households rather wait for the national grid to come in the future than to buy an off-grid connection that offers less than the national grid. Because the grid is highly subsidised, this can be offered at a lower rate. Because private investors have the aim to become profitable, they cannot or do not lower the prices of the products.

"Unfortunately, our products are not affordable to the poorest households. A large part of the market is found among the poorest households but finding a suitable product for them is a challenge" (L. Rwagaju, Mobisol, Personal Communication, 3 March 2020).

The second aspect in which the private sector hinders the development of the energy sector is that products lack cultural feasibility. As explained earlier, many households gather their fuel for cooking and are not familiar with buying fuel. Another share of households buys wood or charcoal for cooking and is not familiar with alternatives like electric stoves or LPG. Therefore, companies investing in high-end stoves have not proven to be successful up until now. Not interviewed for this research, but a well-known example in the Rwandan context is Inyenyeri, a company distributing modern stoves using pellets or briquettes. However, the business model of the company led to bankruptcy. It showed that distributing products that are in its base too expensive for the customer, even when they are offered at a suitable price at the cost of the company, the business will not survive. It shows that companies investing in modern, high-end products cannot develop healthy business models yet, that help with the development of the energy sector.

7.5 Consumers

It can be said that most (potential) consumer households in Rwanda play a supportive role in the development of the energy sector. This group sees the presence of electricity in their homes as a service that increases the wellbeing of their lives. Besides, it is seen as a form of prestige that is highly wanted. Mainly the national grid and to a certain extent mini-grids give prestige, but SHS are often seen as an intermediate step before being connected to the national grid.

For ICS, households are supportive as well, as long as the products are affordable. Otherwise they will simply not buy them. That is the power the consumer has in the off-grid sector. A company may decide to start selling off-grid electricity products or ICS in a certain village or area, however, that does not put any force on households to buy it. The private companies do not have a mandate to oblige a purchase.

Consumers using an off-grid energy source are often involved in satisfaction surveys, which helps the private companies to see where they can improve their business: "It is for us as a company useful to see: how can we improve our service?" (J. Roberts, Mesh Power, Personal Communication, 23 June 2020). This is one way in which Rwandan households can hinder the development of the energy sector in Rwanda. Since many households simply want to wait for the national grid to come, they decide not to buy a SHS or connection to a mini-grid, or they see it as an intermediate step: "I consider my SHS as a backup solution, but not as the main solution for electricity issues in the villages" (N. Uzabakiriho, SHS customer, Personal Communication, 18 March 2020). The same goes for ICS and mini-grids. Whenever a household decides not to buy an ICS or mini-grid connection, there will simply not come an extra connection or ICS.

7.6 Summary of Findings

In table 16, a short summary of the findings described in this chapter is visible. 'Influence' was researched here as the way in which stakeholders supported or hindered the process and created benefits or harmed energy sector development in Rwanda, based on the matrix developed by Ruggerio, Onkila and Kuittinen (2014). In line with their matrix, a division can be made between macro-level and micro-level influence. What can be clearly seen is that all stakeholders have both a positive and negative influence on energy sector development, but the consequential differences between macro- and micro-level show the extent to which events influence energy sector development directly, or indirectly.

Table 16 Summary of Findings Considering Stakeholder Influence on Rwandan Energy Sector Development

	Stakeholder	**Process**		**Outcome**	
		Supportive	Hindering	Beneficiary	Harmed
Macro-level	Government	Cooperation with and involvement of stakeholders in discussions; Budget support for electrification	Low budget support for ICS; Slow development of funding mechanisms; Strict regulations for SHS	Created enabling environment for private investors; High electrification rate	Health impact for households; Target for universal clean cooking; Target for off-grid development
	Non-Profit Development Organisations	Budget support to Rwandan government; Advising and advocating for the government;	Strict measures in finance mechanisms towards the government	Solving financial constraints on government level;	
Micro-level	Non-Profit Development Organisations	Budget support to private sector; Advising and advocating for the private sector	Strict financing mechanisms towards the private sector	Economic development and expansion of private companies	Competition
	Private sector actors	Increase the availability of energy sources; Provide technical advice to government institutions	Interest to compete with other actors; Lack of financial and cultural feasibility	Increased access to energy rates;	Low-income households who cannot afford modern technologies
	Energy consumers	Positive attitude towards grid connection	Negative attitude towards off-grid products		Limited willingness to pay for off-grid products

8. Partnership Influence on the Rwandan Energy Sector

Since the establishment of the SDGs, partnerships have gained a prominent role in the implementation phase of the goals. In the Rwandan case, four active partnerships were discovered for investigation, of which two are a public partnership and two are an MSP. Table 17 describes the four partnerships and their organisational details.

Table 17 Specification of Partnerships Active in Rwanda

Organisation	Partnership	Number of partners	Leading agency	Year of establish-ment	Strategy of partnership
Energising Development (EnDev)	Public partnership	6	National government	2005	Financially supporting initiatives that lead to increasing energy access
Energy and Environment Partnership (EEP)	Public partnership	3	National government	2010	Providing flexible financing to catalyse early stage clean energy innovation
Mini-grids Partnership (MGP)	MSP	320	International Organisation	2014	Exchange information and ideas, and shaping policy and markets to unlock the potential of widespread mini-grid electrification
Energy Sector Management Assistance Program (ESMAP)	MSP	19	International Organisation	1983	Assist low- and middle-income countries to increase know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth.

8.1 Energising Development (EnDev)

Energising Development (EnDev) is a multi-donor partnership existing of six public donors from European countries: the Netherlands, Germany, Sweden, Norway, the UK, and Switzerland. All donors have their ministry of foreign affairs or development agency in the governing board that together develop the strategic and financial planning of the partnership. The German development agency GIZ is the implementing actor, which is also the reason why EnDevs head office is based in Germany. The partnership has an office in Rwanda. Their support strategies are based on financial (results-based financing) and knowledge support (capacity building). EnDev is supporting the Rwandan energy sector by providing financing to all forms of off-grid energy sources. Next to that, EnDev has facilitated the development of a hydro mini-grid site, in cooperation with the private sector. EnDev also supports entities in Rwanda by technical capacity-building and knowledge-sharing. EnDev is actively involved in the implementation of energy policies developed by MinInfra and REG and they have regular meetings together. This gives EnDev a strategic position by having an influence on discussions with the government and also by informing the private sector about these policies and potential opportunities and challenges they might face.

> Many other donors rely on our input. At the moment, we do a SHS project and village grid project and other actors (like WB) want to be a part of it an do another major project, following us, and they use ours as a pilot project. So, they have more money, but they constantly ask us for our documents. How do we do our operations, how is monitoring set up, etc. (P. Lempp, EnDev, Personal Communication, 12 June 2020)

> We often find us in the position of being an advocate to the private sector. We are communicating with them all the time; we disperse our funds to them for their goals. We have more feeling for the difficulties present in the energy environment. We also translate the other way. We know what is difficult in the government and we communicate that to the private sector (Expert interview EnDev, 2020).

Besides knowledge-sharing with the government and the private sector, EnDev provides one of the major microfinance banks in Rwanda, Urwego, with technical capacity building. An example of this is the improvement in contract-design, something Urwego now puts into practice for EnDev. To continuously support the bank, EnDev has one staff member positioned within Urwego full-time. The position of EnDev in Rwanda is highly influential, specifically because of technical expertise.

> The way we work with the government is quite unique. We have online platforms during these corona circumstances and REG joins our meetings and contributes in our chats and works in the same documents, so we are really creating a lot of know-how (P. Lempp, EnDev, Personal Communication, 12 June 2020).

> We hire Urwego for example to do all the contracting of the different countries that take part in our program, so they are our fund and contract managers. We don't do that directly ourselves. This requires know-how and for them to be able to do this, we build this know-how (learning by doing) (P. Lempp, EnDev, Personal Communication, 12 June 2020).

The EnDev funding partnership has limitations for the development of the Rwandan energy sector as well. Similar to a limitation of individual stakeholders is the difficulty concerning the financing mechanism. EnDev uses a results-based financing model which creates risks for the receiving party, being private sector companies. Most of the time, the companies have to commit to their own investment costs at first, before being able to prescribe for EnDev's funding. This is certainly a healthy business model for EnDev, however, for small start-ups it also means the risk of bankruptcy when a project does not succeed.

A limitation - however not directly influencing the Rwandan energy sector in a negative way - that can be assigned to the governance structure occurring in partnerships, is the dominance of the managing partners (Germany and the Netherlands) compared to the other, solely funding, partners. According to an external evaluation executed in 2017, the managing partners appeared dominant in decision-making, which can lead to unfair competition within the partnership (SKAT, 2018). Besides, the German development agency GIZ is the only implementing party 'on the ground' for EnDev's policies, which highlights the strategic advantage of the managing partner.

In table 18 the conditions for success developed by Pattberg and Widerberg (2015) are applied to EnDev's organisation structure. Overall, the partnership is considered successful and their successfulness can be confirmed by scoring positive on almost every aspect. What is lacking, or what can be improved, is transparency on meta-governance level – alignment of policies to international policy goals. One of the challenges within EnDev is the homogeneous, Western, orientation of the members within the partnership that increases the dominance of Western opinions in Rwanda, a trend that has been visible since the increase of other Western stakeholders in the country.

Table 18 Conditions for Success based on Organisational Structure of EnDev

Category	Conditions for Success	Description
Actors	Optimal partner mix	Yes: Combined resources of partners Influential members Combined willingness No: Homogeneous group of partners
	Effective leadership	Yes: Leadership of two partners on the ground No: Dominance of implementing partners in decision-making
Process	Stringent goal-setting	Yes: High levels of precision and therefore limited room for interpretation
	Sustained funding	Yes: funding derived from all 6 partners and no reliance on voluntary funding (because government affiliated)
	Professional process management	Yes: Like-minded donors, all in governing board Full-time staff employed on the ground No: No strong corporate identity
	Regular M&E and reporting	Yes: Bi-annual M&E
Context	Active meta-governance	No: Not transparent
	Favourable political and social context	Yes: Complementary because of local capacity building No: Position within Urwego bank is eroding public authority
	Fit to problem-structure	Yes: Mostly benign problems that are easy to solve: Rwandan government and EnDev are mainly like-minded.

8.2 Energy and Environment Partnership Trust Fund (EEP)

The Energy and Environment Partnership Trust Fund (EEP Africa) involves three public institutions: the Nordic Development Fund, the Austrian Development Agency and the Ministry of Foreign Affairs of Finland. EEP partners with national governments in the countries in which it operates to support their agendas for clean energy and green growth in line with the water-energy-food security nexus (EEP, n.d.).

EEP supports the Rwandan energy sector by financing off-grid energy projects designed by private investors. EEPs major occupation in Rwanda is supporting the mini-grid sector with grants or results-based financing. Besides financing, EEP has supported the Rwandan government in drafting the NEP in 2018 (EEP, 2018) but no further involvement with government agencies can be tracked. The last way of supporting the Rwandan energy sector by EEP is by organising forums for investors and knowledge exchange, to facilitate investment and collect and disseminate policy, development and market-related products, recommendations and lessons learned to advance the sector.

In contrast to EnDev, EEP does not have a main office in Rwanda: their offices are based in Helsinki, Nairobi and Pretoria. It can be said that supporting projects remotely and working with government officials in a country like Rwanda does not positively influence a partnership's position in that country. On the one hand, this means that in this case MinInfra and REG do not identify the partnership as a core player and therefore rely less on EEPs advice and support. It also means that when EEP funds projects, they are dependent on applications they receive online while they are not thoroughly familiar with the context of the project location. Three out of seven projects funded by EEP no longer exist, because of for example bankruptcy.

It shows that EEP has a certain influence on the energy sector in Rwanda because of the many projects funded in a wide range of off-grid sectors. It marks that many private investors in the off-grid sector depend on the funds from EEP, which can sometimes be as high as 60 percent of the total costs of the projects. Therefore, EEP most certainly stimulates the energy sector in Rwanda. Looking at table 19, EEP scores high on the nine conditions for success, better than EnDev. Despite this higher score, they remain a less influential actor on policy-level in Rwanda, or 'on the ground' compared to EnDev. It must be mentioned that their physical absence from the country forms a valid reason for being less influential compared to partnerships with an office in Rwanda. This shows that the organisational success of a partnership is not a harbinger for success in partnership's policy and project implementation.

Table 19 Conditions for Success based on Organisational Structure of EEP

Category	Conditions for Success	Description
Actors	Optimal partner mix	Yes: Resources Knowledge of development institutions Capabilities
	Effective leadership	Yes: Start of partnership in 2010 by NDF and later the gathering of more partners. Still funding manager
Process	Stringent goal-setting	Yes: High levels of precision Committed to the water-energy-food security nexus
	Sustained funding	Yes: Stable funding from three donors No voluntary funding
	Professional process management	Yes: All donors presented in governing board No: Governing board of 14 members, considered too large
	Regular M&E and reporting	Yes: Multiple reports and evaluations per year
Context	Active meta-governance	Yes: Aligned to the SDGs, results according to SDGs are openly monitored
	Favourable political and social context	Yes: Rwanda is a suitable climate for partnerships operating on local level No: No capacity-building measures found in operational projects
	Fit to problem-structure	Yes: Extra financial feasibility of EEP to solve problems or help private sector and governments to solve problems No: Not proven if partnerships can transfer more knowledge to target countries

8.3 Mini-Grids Partnership (MGP)

The Mini-Grids Partnership (MGP) defines itself as the 'umbrella group that can bridge discrete but related stakeholders and initiatives' that organised a platform for knowledge-sharing (MGP, n.d.). "The MGP is a consortium of over 320 like-minded mini-grid stakeholders interested in enhancing and complementing each other's work through collaboration and coordination" (MGP, n.d.). The partnership's main aim is to create a thriving global mini-grids sector to help achieve SDG 7 and does so by for example organising workshops, publishing projects and success stories of mini-grid developers, and supporting financing mechanisms by reaching out to banks, funds and other financial institutions (MGP, n.d.). The MGP is strongly aligned to the UN's SE4All initiative and is recognised as a global partnership on the SDG platform. In contrast to the previous two discussed partnerships, the MGP is a voluntary partnership and has no budget. There only is part-time staff hired for managing the secretary, executive and steering committee.

The fact that all the work from MGP is voluntary and based on knowledge-sharing, instead of being (partly) a donor partnership, changes the scope and position of a partnership in target countries. The MGP has no physical office and works through digital platforms. There is no program from MGP to target mini-grid developments in individual countries but MGP develops know-how for all mini-grid stakeholders. Besides this, there is no evidence on what this intellectual support directly does for the Rwandan government. Even though MGP highlights the targeting of policymakers within governments to help shape policy for public and private sector mini-grid development, the partnership is not mentioned on any government platform. What can be said is that MGP creates a platform for members that are also active within the Rwandan mini-grid sector, like EnDev, the EU, USAID and AfDB. These organisations benefit from the open information from MGP. This gives the partnership its influence, since the stakeholders - of which the most powerful and knowledgeable are part of the steering committee – have complementary strengths and pool their (intellectual) resources and assets in solving problems around the mini-grid market, as highlighted by Clough, Long and Rietig (2019).

An important limitation of the MGP, which touches the amount of influence of the partnership in Rwanda, is the online scope of the partnership and the fact that it has no physical office. Another limitation, which is related to the credibility of the partnership, is the fact that there is no M&E available. The partnership does not – at least not openly – evaluate its impact. There are no reports, databases etc. that discuss the achievements of MGP. Despite the fact that the work MGP does is not measurable in numbers, it gives a partnership – or any organisation – credibility when it can show results.

One more limitation that can hinder the development of the energy sector in Rwanda, is the fact that the partnership 'brings together mini-grids financiers, developers, policymakers and facilitators', but leaves out critical key-players mentioned by Horan (2019) like civil society organisations, local authorities, grassroots organisations or households and productive users in Rwanda. While there is no practical evidence that the exclusion of these groups leads to less performance on the ground, it does show that a steering committee existing of 15 members are all large-scale organisations of which 12 are Western with their headquarters outside of the target countries. This makes the partnership a North-North partnership, without the key involvement of Southern players.

Looking at table 20, the overall organisational performance of MGP is below the performance of EnDev and EEP, with main challenges lying with the absence of funding, lack of open M&E, unknown leadership and no clear direct local influence. This all has to do with low transparency, the fact that MGP is only an online platform and therefore has no office in Rwanda and has more than 300 voluntary members which are not obliged to adhere to certain policies and objectives. This all leads to limited direct influence in the energy sector in Rwanda.

Table 20 Conditions for Success based on Organisational Structure of MGP

Category	Conditions for Success	Description
Actors	Optimal partner mix	Yes: Knowledge-sharing by partners No: No resources from partners
	Effective leadership	Yes: Under auspices of SE4All = UN affiliated No: Unknown executive leader(s)
Process	Stringent goal-setting	Yes: Aligned to SE4All values No: Room for interpretation on voluntary MSP platform
	Sustained funding	No: Voluntary platform without funding
	Professional process management	Yes: Small governing board of most influential organisations No: No full-time staff
	Regular M&E and reporting	No: No open M&E Not transparent
Context	Active meta-governance	Yes: Aligned to SE4All which is affiliated to SDG 7
	Favourable political and social context	Yes: Complementary to each other on the platform No: No clear direct local influence
	Fit to problem-structure	Yes: Partners help each other by knowledge-sharing and the platform is useful for both mini-grid developers as development partners operating in Rwanda

8.4 Energy Sector Management Assistance Program (ESMAP)

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank (ESMAP, n.d.). It is a partnership between the World Bank and 18 partners, which entails development organisations, ministries and foundations that all have a Western base. ESMAP works through the World Bank to accelerate the energy transition to achieve SDG 7 and does so by providing analytical and advisory services to low- and middle-income countries to increase know-how and institutional capacity (ESMAP, n.d.). Over the years, the partnership has influenced a substantial portion of the World Bank's lending in energy access, renewable energy and energy efficiency. ESMAP is governed by a consultative group, which consists of representatives from contributing donors. The World Bank is the only implementing partner of ESMAPs policies and is regulating the evaluations of ESMAPs work through the World Bank's independent evaluation group.

Since Rwanda was selected as one of the country cases done by ESMAP, the influence of the partnership has been significant. The development of ESMAPs multi-tier framework (MTF) to scale access to energy on different tiers has been a baseline for several flagship policy documents in Rwanda: The RES, the 2018 ESSP, the NEP, and the on-grid transmission plan (ESMAP, 2020). The framework specifies energy needs according to for example level of income and can therefore decide whether a household can be sufficiently supported with an off-grid or on-grid connection. This has helped the Rwandan government decide how to implement policies, which led to significant increases in energy access. Besides this, ESMAP provided support to the Rwandan government to adjust electricity tariffs in 2019, which improved the operational efficiency, affordability and accountability of the electricity service (ESMAP, 2020). According to the partnership's own interviews, the Rwandan government highlighted the value of ESMAP in policymaking:

> The beauty of [the ESMAP assessments] was that we could convince the decisionmakers on the tariffs. Before it would have been a political decision without justification. With the analytical work with the support of ESMAP, we were able to highlight the challenges the utility faces, and that helped decisionmakers agree to the quarterly tariff adjustment. It enlightened decisionmakers with data, which they did not have before (ESMAP, 2020, p. 60).

A limitation to the ESMAP partnership is the tension among donors, or more specifically the representatives in the consultative group. The emergence of new donors over the years has led to more individual preferences and requirements, which leads to an imbalance between earmarked and non-earmarked funding. ESMAP's management raises concerns around transparency of reporting on preferenced contributions and how ESMAP programmes are funded. Another limitation is the limited budget for ESMAP's projects in Rwanda. It limits ESMAPs position compared to EnDev, that has a large budget compared to ESMAP. This limited budget is a possible reason for ESMAP to omit the focus on poor and vulnerable people in their strategies. Most partnerships and individual stakeholders attempt to reach this focus group and have proven only to be able to do so with a sufficient budget for both financial assistance and governmental capacity building, which is out of reach for the ESMAP funding.

In table 21, the conditions for success based on the organisational structure of ESMAP are lined out. The strengths of ESMAP are the high number of donors, strong leadership, and detailed mapped governance when designing the MTF for Rwanda. Challenges for ESMAP are the perceived dominance of the World Bank compared to other donors, no transparency in governing board members and the absence of independent external evaluations. Despite the challenges, it shows that the presence of implementing partner World Bank in Rwanda highly contributes to the influence of ESMAP in the country.

Table 21 Conditions for Success based on Organisational Structure of ESMAP

Category	Conditions for Success	Description
Actors	Optimal partner mix	Yes: Like-minded organisations High capabilities for each organisation Resources from donors
	Effective leadership	Yes: World Bank as assigned leader No: World Bank highly dominant
Process	Stringent goal-setting	Yes: Reaching SDG targets 7.1-7.3. Transparent on website
	Sustained funding	Yes: Funding from all 19 organisations
	Professional process management	Not transparent
	Regular M&E and reporting	Yes: Annual reporting on projects No: 'External' evaluation done by WB-affiliated organisation
Context	Active meta-governance	Yes: Conducive to SDG 7
	Favourable political and social context	Yes: Mapped governance architecture when designing MTF No: No signs of local capacity building
	Fit to problem-structure	Yes: Ability to create influential MTF in partnership, reduces legitimacy when done by 1 organisation.

8.5 Summary of Findings

In table 22 a short summary of the findings described in this chapter is lined out. 'Influence' was researched the same as in the previous chapter and based on the matrix developed by Ruggerio, Onkila and Kuittinen (2014). In line with their matrix, a division can be made between macro-level and micro-level influence. All partnerships have both a positive and negative influence on energy sector development, but the consequential differences between macro- and micro-level show the extent to which events affect energy sector development directly, or indirectly. EnDev and ESMAP are recognised mostly as influential partners of the Rwandan government, because of their direct contributions to policy development and capacity building. MGP has considerably less influence in Rwanda, which is caused by physical absence in Rwanda and because of the online identity of the platform. However, indirectly many mini-grid developers are involved in the partnership, which can contribute to more expertise among the developers that are active in Rwanda.

Table 22 Summary of Findings Considering Stakeholder Influence on Rwandan Energy Sector Development

	Partnership	Process		Outcome	
		Supportive	Hindering	Beneficiary	Harmed
Macro-level	EnDev	Budget support for off-grid electrification; Technical capacity building and knowledge-sharing	Stringent and risky financial mechanisms (results-based financing); Unfair competition within partnership	Increased access to energy in rural areas	Energy sector development after failed projects
	EEP	Budget support to private investors in the off-grid sector;	Stringent and risky financial mechanisms (results-based financing);	Increased access to energy in rural areas because of successful funding to investors	Energy sector development after failed projects
	MGP	Support financial institutions in favour of mini-grid developers	Online platform discriminating non-digitalised organisations; No M&E	Developed know-how for mini-grid developers	
	ESMAP	Development of MTF; Advice on adjustments electricity tariffs	Tensions among representatives in consultative group; Limited budget for projects	Improved EARP off-grid electrification and ICS policy implementation; Improved electricity services; Reduced fiscal transfers; Increased access to electricity	Access among poor and vulnerable households
Micro-level	EnDev	Physical office in Kigali; Technical capacity building and knowledge-sharing		Improved contract-design in Urwego Bank	Bankrupt private investors after failed projects
	EEP	Organising forums for investors and knowledge-exchange	No physical office in Rwanda		Bankrupt private investors after failed projects
	MGP	Organising workshops to increase knowledge among mini-grid developers;	No physical office in Rwanda	Developed know-how for mini-grid developers and development organisations in Rwanda	
	ESMAP	Physical office due to presence World Bank		Improved electricity services	

9. Discussion

The four chapters describing the results section above show the complex development of the energy sector in Rwanda and the interdependence of every chapter and thus all stakeholders to each other. In line with the development theory of Deichmann et al. (2010) it is clear that the Rwandan government, but also non-state stakeholders and partnerships, struggle to connect rural households because of remote locations and economic feasibility. Despite the rapid access in electricity in Rwanda, the off-grid sector is now struggling. Individual stakeholder involvement has supported the Rwandan government much, but the influence of partnerships often remains limited. The degree of influence is overall not aligned to the conditions for organisational success described by Pattberg and Widerberg (2015). In this section, the main findings will be discussed and compared to literature described in chapter 2. It will then line out limitations to the research and will end with recommendations for all described stakeholders.

9.1 SDG 7-related Energy Sector Development in Sub-Saharan Africa

Studies discussing the development of the energy sector in SSA often identify the typical characteristics of urban and rural development and their sometimes similar, but often different opportunities and challenges (Deichmann et al., 2010; Tusting et al., 2019; Kahsai et al., 2011). In this case study, their findings can be agreed upon. While urban electricity development is focused on the expansion of on-grid connections, rural and remote areas are assigned to off-grid sources like SHS and mini-grids. Concerning energy for cooking, urban areas use charcoal-based stoves and clean alternatives like LPG, while rural areas still mostly rely on traditional stoves or to a lesser extent on wood-based ICS. While the SDGs highlight the importance of both electrification and the distribution of ICS, electrification appears to be the main priority. Nevertheless, off-grid electrification still lacks feasible solutions.

SDG 7 emphasises the involvement of international development actors and private investors in energy sector development to reach targets 7.1 up to 7.3. Their main role is to support governments financially or technically and to materialise energy policies, particularly in the off-grid sector. While Deichmann et al. (2010) describes the mix of centralised and decentralised power as the least cost option, this can be criticised according to the results. The development of innovative off-grid techniques in both the electrification and clean cooking sector drive up the costs of products and therefore the costs for end-users. While sufficient payment models have been developed like pay-as-you-go and payments in instalments, it appears impossible for development and private sector actors to create affordable options for rural and remote areas. Besides the gap of affordability, the results agree with Loo et al. (2016), who emphasise the cultural, environmental and technical barriers to clean cooking that at the moment withholds rapid expansion of the sector.

The novelty of the SDGs, described by Biermann et al. (2017) is the emphasis on sustainable development, which for SDG 7 implies the inclusion of renewables into the energy mix and especially the electricity mix (target 7.2). While the focus on renewables is feasible in many middle- and high-income countries, this ‘novelty’ creates challenges in low-income countries.

As mentioned in chapter 5 “Rwanda cannot afford the very high pro-renewables tariffs being adopted in some European countries. Renewables incentives will be set at a level appropriate for Rwanda’s circumstances” (MinInfra, 2009, p. 59). While SSA countries may have suitable natural circumstances for i.e. solar PV and modern clean cookstoves, the financial mechanism does not suit the low-income households in rural areas that are assigned to SHS and mini-grids. While the challenge for reaching target 7.1 as described in the first two paragraphs is already large, the requirements for renewables in the energy mix, which comes down to foreign private investors developing high-end products requiring unhealthy amounts of subsidies, make the goal almost impossible to achieve.

9.2 Stakeholder and Partnership Influence Stimulating and Hindering Energy Development

Since the establishment of the SDGs, there has been more emphasis on the involvement of non-state stakeholders and partnerships in reaching SDG targets. While the results are in line with Biermann et al. (2017), mentioning that partnerships are innovative in addressing complex issues and combining expertise and resources for inventive solutions, this does not add up for partnerships not physically present in target counties. Even if they adhere to all conditions for success described by Pattberg and Widerberg (2015), influence is not aligned with this. More relevant here is the stakeholder salience described by Mitchell, Agle & Wood (1997). The degree of power, legitimacy and urgency of a stakeholder creates higher rates of influence in energy sector development. This can be financial power, power of knowledge, the legitimacy of organisations and private sector actors and the urgency of the problem and suitable solutions. However, these characteristics are subjective in relation to the perception of governments and do not have a solid objective base.

When comparing table 16 and 22, both individual stakeholders and partnerships contribute to the process and outcomes of energy policies, primarily in terms of finance, technical expertise and knowledge-sharing. While support of individual stakeholders has a concrete direct positive influence on micro-level, partnerships are mostly involved on policy-level and focus on the bigger picture. On macro-level, partnerships are influential whenever they are based in the country and discuss matters directly with the government. Then partnerships like EnDev and ESMAP can have innovative solutions to energy development by creating tailor-made solutions and becoming the sector lead for technical capacity building which gives them power and proved urgency to the sector.

Individual stakeholders and partnerships hinder energy sector development most by developing strict financial mechanisms for the private sector (by development organisations and partnerships), a negative attitude towards off-grid energy by consumers. The former harms the target for off-grid developments and can lead to company bankruptcy, while the latter limits the distribution of off-grid products because of low demand. Besides hindering energy sector development, partnerships hinder their own objectives because of the physical absence from countries, which is confirmed by the findings of Schäferhoff et al. (2009); Pattberg et al. (2012) and Pattberg and Widerberg (2015) who stated that the effectiveness of partnerships is limited

because of problems with internal working and the ability to deliver objectives. Because of the physical absence partnerships have limited ability of monitoring the progress of funded projects and to implement direct lobby and advocacy practices at government level.

9.3 Limitations to the Research

It is essential to put these discussions into perspective of some limitations to the research, which are identified here. The first limitation concerns the representative nature of primary data gathered. The second limitation is the absence of self-reported data for partnership research the and the third limitation concerns the limited longitudinal effect of the findings.

Because of the outbreak of the pandemic COVID-19 virus, I had work remotely. Thanks to my internship at Resilience BV. in Kigali, I worked together with a colleague to conduct interviews and surveys. Because it was not possible to do them myself, I designed all interview schemes and survey questionnaires, but aside from the surveys online, my colleague conducted all interviews and surveys via phone. Therefore, it can be seen as a limitation that I was not present during the interviews, however, since all interviews and surveys were conducted among non-English speaking households, I would not have been an active interviewer in the first place. However, I could not discover nuance myself and I could not develop follow-up questions on the spot. Nonetheless, the remote data collection forms a valid representation of the energy sector in Rwanda.

The primary data gathered occurred through phonetic interviews. The contact information for phonetic interviews was obtained through two companies providing the details of their customers and the online survey responses were obtained by spreading the word through Facebook. This touches the validity of the data, because of the economic similarity among groups. Also, the remote interview process refrained the interviewer from detecting certain expressions of interviewees.

The absence of self-reported data for partnership research in three of four partnerships created an imbalance in obtained information and resulted in the reliance on secondary data for the other three partnerships, which made it not completely possible to find equally comparable information.

Lastly, because of the relatively short timeline for this research to investigate a vibrant and transforming sector, limits the longitudinal effect of the study. Therefore, there is a possibility that trends in the Rwandan energy sector and more general in SSA, are moved far away from the position they are in now.

9.4 Recommendations

The case study has revealed results that require recommendations for policymakers, non-state individual stakeholders and partnerships. While these recommendations are based on the findings in Rwanda, some recommendations are applicable to other low-income countries, especially in SSA countries with similar economic and cultural circumstances.

The first recommendation, for policymakers, is to better align policies to the country situation, to become more aware of the needs and preferences of households. Especially off-grid energy sources are often not affordable or not aligned to culture and habits, which reduces the pace of energy development. To align policies, national surveys researching preferences and evaluations of used products can be conducted among households with the help of local authorities.

The second recommendation, for non-state individual stakeholders and partnerships is to reduce the current imbalance between implemented policy and currently existing obstacles perceived by households. This can be done by taking three measures:

i. Investigating the options for product development inside the target country, instead of being reliant on expensive import measures that makes electricity expensive
ii. Setting up workshops and courses for local companies or entrepreneurs to stimulate local sector development that help to reduce costs of products help stimulate entrepreneurship among people more familiar with cultural habits
iii. Discuss feasibility of business plans and funding mechanisms with governments and local authorities to discover the chance of success for the organisation or company

The last recommendation, for partnerships, is to research the possibility of opening an office in the target country. This research has found out that the physical absence of a partnership reduces the influential character on policy level, because there are other stakeholders available who support the government just as much. While partnerships can develop innovative solutions for energy sector development because of the possibility of pooled resources, capabilities and knowledge, partnerships could have a competitive advantage compared to individual stakeholders. A prerequisite for that is the physical presence in the concerned country.

10. Conclusion

The establishment of the SDGs in 2015, SDG 7 has created a tendence of initiatives focused on the affordability, reliability, sustainable and modern development of energy in the world. The involvement of the international community, private investors and partnerships in this development has gained a central role and has since contributed to and hindered the development of the energy sector in low-income, SSA countries, based on the results from the Rwandan case.

This research aimed to answer the question "What is the energy development situation in Rwanda and how do individual stakeholders and partnerships influence these developments in line with the 2030 targets mentioned in SDG 7?" While the development and implementation of energy policies in Rwanda have been ongoing long before the SDGs came up, there have never been so many stakeholders involved in these developments around especially SDG target 7.1 (access) and 7.2 (renewable energy) and to a lesser extent target 7.3 (efficiency). Non-state individual stakeholders and partnerships have positively contributed to energy sector development by budget support, technical capacity building and innovative problem-solving capabilities on the one hand and the materialisation of the off-grid energy sector by developing SHS and mini-grids on the other hand and as a result access to electricity in Rwanda has increased significantly over the years. However, the named stakeholders have also hindered sector development through the implementation of stringent financial mechanisms, cultural misalignment of products and the distribution of too expensive and unaffordable products. Moreover, the influence of partnerships not having a physical office in Rwanda remained limited even if the partnership was proved successful according to the conditions for success.

This forms the base for future research directed towards new case studies in SSA or other countries in the Global South with a similar economic and social context, to expand the empirical evidence on increased individual stakeholder and partnership influence on energy sector development or even in other sectors aligned to the SDGs. Rwanda can to a certain extent be seen as a unique case, being the only SSA country present in the Doing Business ranking and therefore having a perceived lead in attracting foreign private investors. This creates an extra opportunity for future research to investigate whether this international involvement is different in countries ranked lower. It would also be valuable to investigate how the clean cooking sector is going to develop in the coming years and whether the same opportunities and challenges will be discovered.

The involvement of an increasing number of non-state actors is not going to decrease in the coming decade in which global governance mechanisms like the SDGs go hand in hand with private sector and partnership development. This research has shown that their involvement and influence creates many opportunities and challenges for governments and end-users. Moreover, the SDG targets are challenging to reach for countries like Rwanda, which makes it even more crucial for state and non-state actors to cooperate and develop a thriving energy sector by 2030.

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Appendix A: Interview Guides

Interview guide households in Rwanda

Purpose of the guide

This topic guide will be used during the households interviews in the Eastern district in Rwanda. The document is designed to be both fixed and dynamic and flexible: it is a guide for discussions and will pursue interesting or relevant insights or topics as they emerge. However, some fixed questions are necessary in order to be able to quickly compare interviews with each other.

Introduction for respondent

Thank you very much for participating in this research project. I am conducting these interviews to evaluate the experiences of Rwandan households with the supply and demand of energy at the moment. The results will be compiled in my Master's thesis concerning energy sector development in Rwanda. I am a student at Utrecht University in the Netherlands and I came to Rwanda because of the interesting developments occurring at the moment

INTRODUCTION

Good morning/good afternoon sir/madam. I am very grateful for having this interview with you. To make sure our notes correctly represent what you say, we would also like to take a voice recording. Do you approve with this?
Up to what extent do you want us to maintain your anonymity? We would very much like to compile a report with personal experiences and perhaps some quotations. Therefore, we want to ask your permission to use your name. If you prefer anonymity, we will of course refrain from doing so.
If you have no objections, we can proceed with the questions?

PERSONAL INFORMATION AND LIVING SITUATION

1. What is your name? (M/F)
2. Where do you live?
    a. District
    b. Sector
3. How many people live at your house?
    - How many children?
    - What are their ages?
4. Do you have electricity in your house?
    - If answer is no, ask question 5 and then proceed to question 16
    - If answer is yes: for how long have you had it now?
5. Which type of energy do you use?
    a. REG electricity

b. **Solar energy**
    i. Mobisol
    ii. Great Lakes energy
    iii. Munyax
    iv. Other:
c. **Biomass**
d. **Gas for cooking**
e. **Hydropower electricity**

ENERGY SUPPLY AND DEMAND

6. Who provides you with energy?
    - Are you connected to the grid, or not?
        - If not, how did they install the off-grid energy?
        - If yes, are all your neighbors connected as well?
7. Do you have electricity all the time, or it cut it off sometimes? If yes, how often? And for how long?
    - What are the major issues you have to deal with when the electricity is cut off?
8. How do you buy electricity?
    a. **Agent**
    b. **Mobile phone**
9. Is electricity expensive for you to purchase?
    - How much does it cost you per month?
    - How much is that, compared to your monthly income?
10. How long does it take for you to get electricity? (**Distance or time**)
11. How much electricity can you use per week?
    - Is that enough to meet your demand?
12. What are the major things do you have at your home that use electricity?
    a. **Radio**
    b. **TV**
    c. **Fridge**
    d. **Gas cooker**
    e. **Lights**
    f. **Phone**
    g. **Kettle**
13. Do you feel satisfied with the type of energy you use? If **yes**, why? If **no**, why?
14. How is the communication with the company that provides you with electricity?
    - Are they easy to reach out to?
    - Are they in the neighborhood regularly to check?
15. How has the availability of electricity had an impact on your daily life?
16. Would you like to have another source of energy for electricity supply than you have now/What kind of energy supply would have your preference? (for example, if you don't have solar energy now, would you prefer solar energy? And if you don't have electricity at all, what would you prefer?)
17. What are major struggles in your neighborhood regarding energy supply and demand?
    - What are your suggestions to the government/investors to deal with this?

Interview guide non-state stakeholder experts and partnership experts

Informed consent

Good morning. I am very grateful for having this interview with you.

My name is Evelien Lambooij. Let me first tell you something about myself. I live in the Netherlands. I also study in the Netherlands, at Utrecht University. I study Sustainable Development and for this research I focus on energy development in Rwanda and the role of individual stakeholders and multi-stakeholder partnerships in this. I am researching this, because the involvement of stakeholders and partnerships is of major importance for the SDGs, and it was of less importance during the MDGs. The goal is to find out whether their involvement is helping Rwanda in reaching its goals by 2030, which are strongly aligned to SDG 7. I am confident that an interview you will help me finding answers to the above-mentioned research objective.

Before writing my thesis, I was hosted by a consultancy company from the Netherlands, focused on agri-food and energy development, called Resilience BV. I wrote a Business Opportunity Report (BOR) for potential new investors in the Rwandan energy sector.

To make sure I will not miss important parts of the interview, I would like to record this conversation. Do you approve? If preferred, your name will stay anonymous and will not be shared with third parties.

- What do you do to support the Rwandan energy sector?
  - Can you mention successful energy projects done in Rwanda?
  - What do you think gave the project(s) its success?
- What is the current status quo of the energy sector in Rwanda?
  - The percentage of energy access in Rwanda is still low and energy generated has also failed to meet the expectations that were aimed for. What do you think is the reason for this? What are the bottlenecks?
  - How can the government/private sector improve it further?
- How do you cooperate with the Rwandan government/MININFRA/REG?
  - Has this cooperation changed in the last 5 to 10 years?
- What are currently interesting political/policy developments that will influence the energy sector?
- Does you have partners in particular to cooperate with?
  - Why these organizations?
  - Also private sector partners?
- Do you have a specific role in policy development regarding the energy sector?
- If yes: How has this role developed over the years?
  - If no: what does you do to support the Rwandan government in achieving its goals?
- Have you adapted policies/plans according to the ESSP/biomass strategy developed by the Rwandan government?
  - If yes: what has changed?
  - If no: are there any future plans for doing this?
- The SDGs also call for more involvement of NGOs/private sector/civil society, and more focus on (multi-stakeholder) partnerships. Does this have consequences for your position in Rwanda regarding energy policies and operations?

- Did it have consequences for the mission dedicated to Rwanda?
    - If yes: what were these consequences?
    - If no: have you noticed increased influence of NGOs/private sector/civil society or multi-stakeholder partnerships in energy development in Rwanda over the last 5 years?

Appendix B: Survey Questionnaires

Survey households using wood-based ICS or traditional stoves

1. Do you use an ICS?
    a. Yes: Go to question 2
    b. No: Go to question 17
2. Are you happy with your ICS?
    a. Yes: Go to question 3
    b. No: Go to question 4
3. What do you like about it?
    a. Go to question 5
4. Why are you not happy?
    a. Would you rather go back to your previous way of cooking?
5. Were you aware of the existence of ICS before you got one?
    a. Yes: Go to question 6
    b. No: Go to question 7
6. Did it take long to become convinced of the positive sides of an ICS?
    a. Go to question 8
7. How did you become aware of it?
8. Are more households in your environment using an ICS?
    a. Yes: Go to question 9
    b. No: Go to question 10
9. Do they experience it the same as you? Why/why not?
    a. Go to question 11
10. Why not?
11. Do you think your ICS is affordable?
    a. Yes: Go to question 12
    b. No: Go to question 13
12. How much does it cost?
    a. Go to question 14
13. How much would you be willing to spend?
14. Is there anything you would like to change about your way of cooking in the future?
    a. Yes: Go to question 15
    b. No: Go to question 16
15. What specifically?
16. Why not?

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17. Which way of cooking do you use?
18. Do you buy your fuel or do you gather it?
19. Are you happy with your way of cooking?
    a. Yes: Go to question 20
    b. No: Go to question 21
20. What are the positive sides?
    a. Go to question 22
21. What would you rather prefer?
22. Are you aware of the existence of ICS?
    a. Yes: Go to question 23
    b. No: Go to question 24
23. What do you think of it and why do you not have one?
    a. Go to question 25

24. *Shortly explain what ICS is*
25. Which way of cooking do most of your neighbours use?
26. Would you want to change anything in the future related to cooking, or is there anything else you would prefer as cooking alternative in the future?
    a. Yes: Go to question 27
    b. No: Survey completed
27. Why do you want this?
28. Is this affordable to your economic situation?
    a. Yes: Survey completed
    b. No: Survey completed

Survey households using charcoal-based ICS

1. Are you happy with your ICS?
    a. Yes: Go to question 2
    b. No: Go to question 3
2. What do you like about it?
    a. Go to question 4
3. Why are you not happy?
    a. Would you rather go back to your previous way of cooking?
4. Were you aware of the existence of ICS before you got one?
    a. Yes: Go to question 5
    b. No: Go to question 6
5. Did it take long to become convinced of the positive sides of an ICS? Why/why not?
    a. Go to question 7
6. How did you become aware of it?
7. Are more households in your environment using an ICS?
    a. Yes: Go to question 8
    b. No: Go to question 9
8. Do they experience it the same as you? Why/why not?
    a. Go to question 10
9. Why not?
10. Do you think your ICS is affordable to your economic situation?
    a. Yes: Go to question 11
    b. No: Go to question 12
11. How much does it cost?
    a. Go to question 13
12. How much would you be willing to spend?
13. Is there anything you would like to change about your way of cooking in the future?
    a. Yes: Go to question 14
    b. No: Go to question 15
14. What specifically?
    a. Survey completed
15. Why not?
    a. Survey completed

Survey households connected to the national grid + questions on their cooking habits

1. In which province do live?
    a. Kigali district
    b. Southern province
    c. Western province
    d. Eastern province
2. In which district do you live?
3. How many people does your household consist of?
    a. 1-2
    b. 3-4
    c. 5-6
    d. 7 or more
4. Which electrical devices do you use at home? (multiple answers are possible)
    a. Lights
    b. Television
    c. Radio
    d. Fridge/freezer
    e. Mobile phone and charger
    f. Computer/laptop and charger
    g. Other kitchen devices (microwave, kettle, blender etc.)
    h. Other, namely…
5. How do you buy electricity? (multiple answers are possible)
    a. Mobile Money
    b. Pay As You Go
    c. Via an Agent
    d. Other, namely…
6. How much is your monthly consumption in RWF?
7. Do you think this is affordable to your economic situation?
    a. Yes
    b. No
    c. Sometimes
8. If your answer to the previous question was ‘no’ or ‘sometimes’, please specify shortly why this is the case and how much you would be willing to pay in RWF?
9. If you do not use Mobile Money to buy electricity, how far do you have to travel to buy it?
    a. 0-10 minutes
    b. 11-25 minutes
    c. 26-45 minutes
    d. More than 45 minutes
10. How reliable is your electricity connection on a scale from 1 (very unreliable, daily power cuts) to 5 (very reliable, no power cuts ever)?
11. How do you communicate with your electricity provider when this is needed?
    a. Direct (mobile phone, social media, email etc.)
    b. Indirect (via landlord, agent etc.)
12. What is your experience with your electricity provider on a scale from 1 (very bad experience) to 5 (very good experience)?
13. Please specify your previous answer in 1 or 2 sentences. Why are your experiences good or bad?

14. Which type(s) of energy source(s) do you use for cooking? (multiple answers are possible)
    a. LPG
    b. Charcoal
    c. Wood
    d. Pellets/briquettes
    e. Kerosine
    f. Other, namely…
15. Do you use an ICS?
    a. Yes
    b. No
16. If you answered the previous question with yes, please specify the brand of the cooking stove
17. How much is your monthly consumption of fuel for cooking in RWF?
18. Do you think this is affordable to your economic situation?
    a. Yes
    b. No
    c. Sometimes
19. If your answer to the previous question was ‘no’ or ‘sometimes’, please specify shortly why this is the case and how much you would be willing to pay in RWF?
20. If you have any suggestions on how your access to energy (electricity and cooking fuel) could be further improved, please indicate here.