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The Nexus Between Renewable Energy Access Financing and Climate Adaptation.

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Abstract

The global society is increasingly impacted by climate change. Not only prevention of this change is necessary: the world also needs to adapt to the inevitable climate hazards that will present themselves. At this moment, climate financing is mainly directed towards climate mitigation. One mitigation measure is the enablement of renewable energy access in developing countries. Therefore, this research investigates how the nexus between renewable energy access and climate adaptation can be more exploited within renewable energy access financing. This is done with the aim of creating more bilateral finance. To conduct this research, qualitative methods are used. The Netherlands Enterprise Agency (RVO) is used as a case study. Eleven interviews are held with implementers of renewable energy access financing programs. The AMP-framework (Awareness, Motivation, Pathways) is used as a basis to identify how the behavior of these implementers can be shifted from being only mitigation focused, to being focused on mitigation while integrating adaptation benefits. Findings show that the financing gap between climate mitigation and climate adaptation could be decreased when climate adaptation impacts are explicitly integrated in renewable energy access financing. In order to make that shift, more knowledge must be brought in the organization, a collective understanding about the nexus and the approach that needs to be taken must be reached, and indicators to measure progress should be developed. The three elements of the AMP-framework do not have to be present within every individual, but all have to be present in a group as a collective in order to make that shift. Besides, the elements are not a prerequisite to each other, but they definitely influence each other.

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1. Introduction

The global society is increasingly impacted by climate change (IPCC, 2021). Climate change can be defined as: ‘the shift in climate patterns mainly caused by greenhouse gas (GHG) emissions’ (Fawcy et al., 2020; p. 2070). The GHG that are included in this definition are both naturally as well as anthropogenically emitted. The anthropogenic emissions mainly stem from the use of fossil fuels like coal, oil, and gas (IPCC, 2021). It is therefore very important to shift from the use of fossil fuels to the use of renewable energy sources, such as wind, solar and biogas. This shift is called climate mitigation, which can be defined as the human intervention to decrease GHG emissions in order to prevent the increase of climate change (IPCC, 2014). A lot of money is needed for the fight against climate change. A large share of climate financing is dedicated to climate mitigation (GCA, 2020), invested in all sorts of projects and interventions. One of the possible interventions is the stimulation of renewable energy access.

Energy access contributes to food security, water security, good governance, and income generation at both a societal as well as an individual level (Oparaocha & Dutta, 2011). However, energy access is not self-evident in every region. In fact, access to energy varies strongly between different areas, ranging from off-grid to on-grid, and urban to rural locations (Udin & Taplin, 2015). It is discernible that energy access is important and very relevant on a societal level. However, energy is also a key topic when it comes to addressing global challenges like climate change, but also human well-being and sustainable development (IIASA, 2012). When access to energy is enabled, it is important to make sure that this energy comes from renewable sources, to prevent climate change from accelerating. This is where climate financing for renewable energy access comes into sight: the highly needed energy access can be obtained by arranging financial sources for renewable energy technologies.

Although mitigation can contribute to the deceleration of climate change, it is becoming increasingly apparent that climate change is already manifesting in climate hazards, both fast-onset as well as slow-onset. These climate hazards are globally visible, noticeable, and appearing more rapidly than expected (IPCC, 2022; UNCCS, 2019). Therefore, climate financing should not only be focusing on climate mitigation, but also on climate adaptation. Climate adaptation can be defined as the prevention or moderation of harm caused by climate change and the adjustment to climate hazards (IPCC, 2014). At this moment, most of the climate financing is directed towards climate mitigation, instead of climate adaptation. Remarkable in a time where adaptation is becoming increasingly important. Financing options where money is dedicated to both adaptation and mitigation, called bilateral finance, have only been slowly increasing since 2013 (UN, 2021).

Literature shows that there is a nexus between climate adaptation and renewable energy access. Having access to energy, among other benefits, can diversify livelihoods, it can bring shade, it can enhance water security and food security, and it can bring health benefits (Murphy &

Corbyn, 2013; Jeong & Ko, 2021; Perera et al., 2015). Exploiting this nexus could therefore increase both mitigation and adaptation with the same amount of money.

This research dives into the issue of this adaptation finance gap. The need for adaptation is becoming increasingly apparent. However, investors and donors are not dedicating enough money to this urgent issue, caused mainly by a lack of profitable business models or a missing feeling of urgency (GCA, 2020). Besides the option to dedicate more financing specifically to adaptation, it could also be an option to increase bilateral finance or to add more adaptation benefits to mitigation finance. When the nexus between energy access and climate adaptation is exploited, financing programs would then both be preventing climate change from increasing, while also aiding regions with the climate hazards they are confronted with. This research will therefore investigate whether there might be advantages of financing for energy access to climate adaptation. Besides, the research will examine if and how behavior of implementers of financing programs can be shifted from being only mitigation focused, to being focused on mitigation while integrating adaptation benefits.

This leads to the following research question:

How can the nexus between renewable energy access and climate adaptation be more exploited within renewable energy access financing?

To conduct this research, the subsidy programs for renewable energy access of the Netherlands Enterprise Agency (RVO) will be taken as a case study. RVO is a Dutch implementing organization, and the team that was targeted for this research is commissioned by the Dutch Ministry of Foreign Affairs. The subsidy programs provide different forms of financing to encourage the enablement of renewable energy access in countries with a low electrification rate. These countries are mainly based in Sub-Saharan Africa, with a few exceptions in South-East Asia. This research will therefore also focus on the climate hazards in those geographical areas. This research will use qualitative methods, as implementers of the financing programs will be interviewed.

The objective of this study is to investigate how the financing gap between climate mitigation and adaptation can be effectively decreased by integrating climate adaptation into renewable energy access financing. A closely related objective is to analyze how the focus of an implementing organization could shift from being only mitigation focused, to being focused on mitigation while also integrating adaptation benefits. This would lead to a triple benefit of development through increased energy accessibility or affordability, climate mitigation and climate adaptation.

This study has a high societal relevance, as climate hazards are increasingly happening, with huge climate disasters as a consequence. In order to prevent these negative impacts of climate change, it is crucial to find ways in which financing can be mobilized to increase resilience.

Besides, the organization that is taken as a case study is in search of these advantages, as they acknowledge the need for adaptation but are looking how to implement this within existing programs. As they are commissioned by the Dutch Ministry of Foreign Affairs, they have a huge reach and budget to make societal impact. Furthermore, this research has great academic relevance. A lot of literature has been written on the importance of renewable energy access. There is also plenty of literature on the financing gap and the importance of closing this gap. A gap in the literature can be found when searching for solutions. This research looks however at actions that can be taken to exploit the nexus between renewable energy access and climate adaptation, thereby integrating adaptation benefits into renewable energy access financing. Therefore, this research is academically relevant.

The paper begins with providing a literature review conducted on the topics of climate financing and the nexus between renewable energy access financing and climate adaptation. It then elaborates on the methodology, followed by a results section in which the findings of the interviews are presented. The paper proceeds with a discussion on the findings, ending with a conclusion.

2. Literature review

In this section, a literature review is conducted on the research strands that are important for this research. Three questions are answered in this literature review. First, an elaborate discussion is presented in order to give a comprehensive overview of what climate financing, and in specific renewable energy access financing, entails. Second, the impacts of renewable energy access on climate adaptation are discussed. Last, a framework that looks at behavioral change regarding sustainable behavior is introduced. This academic framework is used as a base for the qualitative interviews.

2.1 Climate financing

The first topic this literature review investigates is climate financing. Climate financing can be defined as the mobilization of finance that is used for either climate mitigation action, climate adaptation action, or bilateral action (Fankhauser et al., 2015; Bracking & Leffel, 2021). The UNFCCC (2022) uses a more extensive definition: “climate finance refers to local, national, or transnational financing, which may be drawn from public, private and alternative sources of financing. Climate finance is critical to addressing climate change because large-scale investments are required to significantly reduce emissions, notably in sectors that emit large quantities of greenhouse gasses. Climate finance is equally important for adaptation, for which significant financial resources will be similarly required to allow countries to adapt to the adverse effects and reduce the impacts of climate change.” This definition was developed very recently and indicates that financing is important for both mitigation and adaptation. However, a lot of climate financing is going to climate mitigation action: in the years 2017-2018, only US\$30 billion was dedicated to adaptation, while US\$537 billion was dedicated to mitigation (UN, 2021). Remarkable because, as the UNFCCC definition states, climate adaptation is in need of plenty more money in current times (Timilsina, 2021).

There are a number of reasons why it is harder to mobilize finance for climate adaptation compared to climate mitigation. Developed countries made an agreement in 2009 that climate finance would be mobilized up to 100 billion dollars in 2020 (UNFCCC, 2022). Of this finance, half was earmarked to be spent on climate adaptation finance. However, many projects that are registered as contributing to climate adaptation are not actually solving any climate adaptation issues. Hattle et al. (2021) state that the current official data for climate adaptation finance are far too high and overstated by a majority of donors. Surprisingly, the Netherlands does not overreport its contribution to climate adaptation but under-reports its adaptation finance. This result is concluded from an analysis of 112 projects, of which only nine projects and seven donors including the Netherlands under-report instead of over-report (Hattle et al., 2021). Because of this global overstatement, it seems that less money is needed compared to what is actually needed to increase resilience. The report determined several reasons to explain the global overstatement. First of all, many countries do not distinguish between projects with adaptation as the main objective, and projects with adaptation as a minor objective. In both instances, the full budget is often reported,

while the direct impact differs significantly. Second, loans are often lent at rates that profit providers, and this face value is being reported, which is not fully contributing to climate adaptation. Another reason why it is difficult to mobilize financing for climate adaptation is that it is hard to define the additionality of climate adaptation projects. It is challenging to define indicators to determine what additional positive impact is being made adaptation-wise. This issue related to additionality can also be linked to the lack of viable business models for adaptation measures (Dervis & Milsom, 2010). Although many actions and funds have been developed, it is a search to find the right machinery to productively implement funding programs (El-Batran & Aboulnaga, 2015).

It becomes clear that the ratio between mitigation finance and adaptation finance is off balance. A substantial amount of climate mitigation finance is going to renewable energy access. This key concept can be defined as available energy access coming from renewable and sustainable energy sources (Udin & Taplin, 2015). Energy access is defined by the International Energy Agency as: “a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average” (IEA, 2020). This includes having access to, at a minimum, several lightbulbs, a radio, phone charging, one refrigerator, and maybe a fan. This equates to an annual electricity consumption of 420 kWh per household when efficient appliances are used, but 1250 kWh with standard appliances (IEA, 2020). Financing for renewable energy access is highly needed as universal energy access is one of the sustainable development goals (SDG7) and is seen as a topic with a high priority (Garside & Johnstone, 2022; Bogdanov et al., 2021; Schwerhoff & Sy, 2017). Energy is crucial to improve living standards and develop a wealthy economy. It contributes both to basic needs as well as to more luxury needs (Liming, 2009). A division can be made between energy needed for electricity and energy needed for clean cooking facilities. Electricity is needed to have access to light, but also to be able to use appliances like air conditioning, a fridge, a heater, or digital appliances. Energy for clean cooking is crucial as well. It protects the environment as biomass is no longer used, it empowers women as they do not have to gather natural resources for fire, it improves health conditions and helps save people money and time (CCA, 2022). In 2015, 4 billion people still lack access to energy, of which 1.1 billion people lack access to electricity and 2.9 billion people lack access to clean cooking facilities (IEA and Worldbank, 2015). This lack of access can be caused by both the situation that there is no grid nearby, or by a lack of affordability. This access deficit is mostly located in rural areas, specifically in South Asia and sub-Saharan Africa, and East Asia regarding cooking (Rai et al., 2016). Decentralized renewable energy access options are often only affordable for higher-income groups as can be concluded from case studies in South Africa, Ghana, Kenya, and Namibia (Boamah, 2020). These rural, off-grid regions are often exposed to disproportionately high climate vulnerability, which is one of the important reasons that energy access should be increased (Butu et al., 2021).

To increase energy access, around USD 50 billion is needed every year until 2030 (IEA, 2011). The technologies that can be used to achieve universal energy access are existing and of high quality. These technologies include off-grid systems, such as mini-grids, solar home systems, biogas digesters, and clean cooking facilities (Garside & Johnstone, 2022). The financing can go to different actors, all with the aim to provide households in decentralized regions with renewable energy access. Rai et al. (2016) have identified different actors with different finance needs regarding renewable energy access financing. The first actor is the energy user. The energy user is in need of finance for energy products, related energy equipment, and maintenance. This can be achieved by, among other options, demand side subsidies (DSS) (Rysankova, 2018). The second actor is the energy provider, who is seeking capital for enterprise development and working capital. This can be achieved by, among other options, supply side subsidies (Rysankova, 2018). Besides, this actor also needs finance to come up with solutions to address the customer affordability gap. The customer affordability gap can be defined as the difference between the price that a household can pay for energy technologies and the actual price of energy technologies (Bandi et al., 2022). Third, financial institutions are an actor. They need finance to channel finance from the energy provider to the energy user. Furthermore, they need to develop risk mitigation instruments. The last actor is the national government which needs finance for the development of policies and regulations, market development, and reforms to a wider enabling environment. Research shows that private participation in the renewable energy market is important and that public finance should be directed towards these actors to create a sustainable market (Rasoulinezhad & Taghizadeh-Hesary, 2022; Michaelowa et al., 2021). Increased private sector participation in an organized regulatory environment can enhance renewable energy access because of better decentralized management, access to additional finances, and improved technical capacity (Chirambo, 2016). There have been a lot of successes demonstrated in cases where private sector involvement was encouraged, for example in South Africa, Sierra Leone, and Uganda (Addax Bioenergy Management SA, 2013; Sandström, 2011; Fielding et al., 2015).

2.2 The nexus of renewable energy access financing and climate adaptation

2.2.1 What is climate adaptation?

Climate change is inevitably going to lead to more climate extremes. The key climatic extreme events are heat waves, wildfires, droughts, flooding, and precipitation (Aghakouchak, 2020). These events are a threat to the well-being of society, in many different ways. That leads to the following important concept: climate adaptation. Climate adaptation can be defined as the prevention or moderation of harm caused by climate change and the adjustment to climate hazards (IPCC, 2014). It can be transformational, incremental, reactive, and anticipatory (IPCC, 2022). The goal of climate adaptation is to exploit the adaptive capacity of an area to build climate resilience. Adaptive capacity can be defined as the potential ability of systems to adjust to potential damage. Climate resilience can be defined as the actual ability of a system to continue in the face of climate hazards (IPCC, 2014). It is important to contribute to these concepts and make them

more concrete, as climate change is happening now, and more and more people are vulnerable to the effects. In the next section, the nexus between renewable energy access and climate adaptation is discussed, thereby investigating how renewable energy access can stimulate climate resilience.

2.2.2 Nexus between renewable energy access and climate adaptation

Having access to renewable energy can highly contribute to climate adaptation and climate resilience. Renewable energy can come from versatile energy sources, thereby serving a range of needs concerning climate adaptation. Renewable energy is the perfect source for the solutions, as it gives the possibility for a win-win situation. Instead of having to deal with the trade-off between climate mitigation and climate adaptation, both objectives are achieved. It is important to acknowledge that renewable energy sources can also be affected by climate hazards themselves. Notably, more research has been conducted on this relationship (Ravestein et al., 2018; Bogmans et al., 2017; Burnett, Barbour & Harrison, 2014; Sun et al., 2021; Orsato, Barakat & de Campos, 2017). However, this research only looks at the impacts of renewable energy access on climate adaptation, instead of the other way around. This choice was made as there is less research conducted on that relationship, and because it is very important to see how renewable energy access can increase climate adaptation. Research about this energy access-adaptation nexus has taken a kickstart in the last decade, although a lot more research is needed to provide more evidence for the relationships that have been established within existing literature. The following paragraphs will give an overview of the co-benefits of renewable energy access on climate adaptation.

Murphy & Corbyn (2013) wrote one of the first articles on the nexus. They identified several ways in which renewable energy access can contribute to the enablement of climate adaptation. First, renewable energy access improves human well-being both physically and economically. Murphy & Corbyn (2013) state that an increased well-being leads to a greater capacity to adapt. However, they do not state why this causal relation exists. Having access to energy also builds resilience within communities. Energy enables a whole bunch of productive activities, thereby diversifying livelihoods in such a way that vulnerable activities can be prevented. Energy use can decrease the time needed for activities, it can increase the productivity level, and it can increase the number of options available regarding livelihoods. All these benefits make livelihoods less vulnerable to extreme climate hazards. Another advantage of renewable energy access is the enablement of innovation and adaptation through the use of ICT. Mobile phones, radios, and TVs become available when there is access to energy. Consequently, information about weather forecasts and threats can more easily be provided. Furthermore, it helps to raise awareness on how a community can best adapt to local climate hazards. However, these are all more general advantages, not yet applied to specific sectors or needs. Lastly, energy access allows communities to prepare for threats like pandemics due to a higher income, which is especially relevant at the time this paper was written (Zaman, van Vliet & Posch, 2021).

A closer look can be taken at all this potential by specifically focusing on different sectors

within a country or area. Adaptation issues of different sectors can be addressed by renewable energy access, these sectors being: agriculture and forestry; food; water; human health; oceans, coasts, and small islands; and human health (Jeong & Ko, 2021). Renewable energy can enable the implementation of energy-intensive solutions like desalination of the soil, irrigation, and air conditioning within sectors (Jeong & Ko, 2021). Solutions that are non-energy-intensive are also enabled by renewable energy access. Examples of these solutions include shade offered by solar panels, the reduction of evaporation of agricultural moisture, and the use of by-products originating from biogas facilities to create fertilizer (Jeong & Ko, 2021).

Perera et al. (2015) identified different types of energy technologies, their applications, and their adaptation benefits. The first energy technology mentioned is the use of biomass consisting of peanuts, shells, and bagasse, which can be applied to generate heat and electricity. The adaptation benefits that are connected to this application include the prevention of deforestation and desertification. It is important to keep in mind that specifically the use of the aforementioned materials prevents these events, as biomass would normally actually stimulate these events because wood or other natural materials are needed. Second, wind pumps can be applied to stimulate irrigation, water pumping, and crop processing. This provides greater resilience to climate hazards, as vulnerability due to water scarcity is reduced. It also gives more options regarding agriculture: it is not solely dependent on rain anymore. This increases food security in an area. Third, biogas plants can produce sludge for fertilizers, thereby providing adaptation to soil erosion and environmental degradation. Solar home systems can provide applications specifically for home use, like heating, cooling, cooking, and lighting. This provides adaptation to extreme temperatures. It also provides access to ICTs, thereby increasing resilience by the enlarged information supply. Last, solar PV can also be applied to uses like lighting, water desalination, and water pumping. This builds resilience in periods of drought as it reduces vulnerability to water shortages.

This sounds very promising, but the potential benefits of renewable energy access for climate adaptation have not been fully explored yet. Various limitations to unlocking this potential can be identified. First of all, there is insufficient literature to define the exact relations between specific technologies and adaptation benefits. Additionally, it is hard to define what a ‘successful’ adaptation includes (Sharma, 2019). Furthermore, there are often quite some different actors and institutions involved, which makes it difficult to successfully and efficiently implement the nexus between renewable energy access and climate adaptation. Last, as mentioned before, access to financial and other resources is lacking (Ogola, Davidsdottir & Fridleifsson, 2012).

The potential for climate adaptation impacts from renewable energy access financing can develop into action when resources are mobilized, when policies converge across sectors, and when nexus points are purposefully identified and targeted (Mpandeli et al., 2018). It is desirable to have some degree of coordination on a national scale to enable advantageous conditions (Ernst & Preston, 2017). To reach these circumstances and integrate climate adaptation benefits more in renewable energy access financing, the situation regarding climate adaptation must change. To

achieve that, the behavior of the people with resources should shift towards a more integral view on mitigation and adaptation, thereby giving adaptation a more apparent role. In the next paragraph, a framework will be explained that is designed to see how sustainable behavior within both individuals as well as within organizations can change.

2.3 Sustainable behavioral change within organizations

To investigate if and how the financing schemes for renewable energy access can be changed in order to integrate climate adaptation more in these schemes, it is important to use an academic model to see how change comes to being both individually as in an organization. A lot of research has been conducted on the question of how organizations can change their behavior towards more sustainable or climate-friendly options. One of the frameworks that is often used to illustrate how behavior is changed, is the AMP framework, standing for awareness, motivation, and pathways (Honig et al., 2015). The AMP framework investigates how and why individuals act the way they do, especially when their actions have consequences of public interest. These consequences could be economic, social, or environmental (Simpson et al., 2021). Therefore, this framework is well suited to investigate if the impacts of renewable energy access on adaptation are known, and how this nexus could be emphasized, especially because this research focuses on a topic with public interest. This framework is based on 38 variables, all related to pro-environmental behavior. As mentioned, three fundamental elements are identified that can potentially lead to behavioral change: awareness, motivation, and pathways. In the next paragraphs, these three components are explained elaborately, as this research is based on these components, so a good understanding is crucial.

Awareness in this framework is defined as not only the acquisition of knowledge, but also the sensibility out of which actions emerge (Honig et al., 2015). Awareness often exists within the context of others. Therefore, knowledge awareness can also be defined as information about other knowledge, or others' knowledge (Engelmann et al., 2009). A concept that is of importance to knowledge awareness is a shared mental model, which means that a team or group has the same mental representation of information and tasks (Engelmann et al., 2009). The way that individuals process provided information based on their own point of view shapes their decisions and actions. Therefore, these actions could be steered by changing the knowledge awareness of the individuals (Dizén et al., 2005). Through the shift of this awareness, alternative conceptualization of the environment develops (Byram, 2011). Regarding climate adaptation, this knowledge awareness can be shifted by using a combination of shielding (the moderation of pressures in the selection environment), nurturing (the stimulation of the development of knowledge), and empowerment (raising the influence on decisions or actions). These three steps will also lead to knowledge co-production, thereby involving a complete team or organization in the shift in knowledge awareness (Boon et al., 2019).

Motivation is defined as “the drive of actors to change ecologically harmful practices towards those that ensure long-term ecological sustainability” (Honig et al., 2015; p. 19).

Motivation can stem from extrinsic values and intrinsic values. Examples of extrinsic values are rewards, reputation, and risk (Honig et al., 2015; Bopp et al., 2019; Peters et al., 2018). Intrinsic values are mainly reflected in personal norms and personality (Honig et al., 2015; Bopp et al., 2019; Sloot et al., 2018). Whether motivation is found extrinsically or intrinsically, it is crucial for an individual to have a motivation in order to act.

Pathways are defined as “possible courses of action that enable actors to shift their practices towards those that support long-term ecological sustainability” (Honig et al., 2015; p. 20). For behavior to change, there should be a facilitation of options to choose from. This can differ per context. However, it is important that an organization offers the flexibility to change behavior for the better.

The outcomes of this framework could show whether the individuals working in a public environment are aware of the consequences of their programs. Furthermore, it can show which motivation they need in order to create or emphasize co-benefits for climate adaptation. Lastly, it can show which actions can be taken to change current behavior in programs towards behavior that includes adaptation more.

3. Methodology

The methodology that was used for this research was fully qualitative, in an exploratory form. This form was chosen to enable other questions to arise as the research progressed. To conduct this qualitative research a case study was used, combined with key-informant interviews on the nexus between energy access and climate adaptation, and semi-structured interviews with people working as an implementer of the financing schemes for access to renewable energy within RVO. In the following section, the methodology of this paper will be elaborately discussed.

3.1 Case study

A case study has been used to conduct this research. A case study can be defined as: ‘... an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident’ (Yin, 2009; p. 640). As it is important to get a good understanding of how adaptation advantages could be implemented, it is good to place this question into an existing context. Subsidy programs for renewable energy access from the Netherlands Enterprise Agency (RVO) were used to get a better understanding of the nexus between renewable energy access and climate adaptation, and the awareness of the organization about the opportunities regarding this topic.

RVO is an implementing organization and works for the Dutch government, the European Union, provinces, and municipalities. This research targets only the subsidy programs that are commissioned by the Dutch Ministry of Foreign affairs. The ministry develops policies and designs, and provides the budgets. RVO executes and implements these policies with the given budget. The mission of RVO is to create a healthy and sustainable environment in which entrepreneurs can thrive (RVO, 2022). The organization considers everyone that wants to contribute to “an economically stronger and more sustainable country as enterprising”. So, the target group of RVO differs from individuals to businesses and municipalities. This research is specifically focused on the subsidy programs that have an international outlook. RVO offers different services, like financing, consultation, networking, or helpful conversations. The organization has about 4.500 employees (RVO, 2022).

For this research, implementers have been interviewed that execute subsidy programs for the Global Climate and Energy Team (*Mondiale Vraagstukken Energie en Klimaatteam*). This team focuses on an international context, thereby stimulating sustainable growth in less-developed or developing countries. To be included in this research, the programs had to be still running in 2022. Some programs have started a bit earlier than others, but they are all recently revised to fit the context of the year 2022. These subsidy programs subsidize many projects in developing countries with a low rural electrification rate. This is done with the objective of providing renewable energy access to those who do not have energy access at the moment. The targeted countries are mainly based in Sub-Saharan Africa, as the rural electrification rate is the lowest

there, with a few exceptions in South-East Asia. Besides, the target countries change over time as the ministries change every four years. This means that other priorities rise up every four years.

This case study also provides a geographical focus for this research. Namely, the organization is based in the Netherlands, and the relevant team works mainly for the Dutch Ministry of Foreign Affairs. This is essential information, as the current Dutch politics are reflected in the operations of RVO. Besides, this research will also look at funding programs aiming at countries with a low electrification rate. The focus is mostly on off-grid, rural areas. These areas are mainly located in Africa, specifically Sub-Saharan Africa. A minority of countries are located in South-East Asia. Consequently, the academic literature used in this paper is also focused on these types of geographical areas.

3.2 Key expert interviews

Key expert interviews have been held during the research process, before the other interviews were conducted. This was done for distinct reasons. First of all, the key experts gave many insights into the topic and valuable expertise knowledge that has been integrated into the paper. Second, it provided the researcher with a broad outlook on the topic, which prevented tunnel vision from happening during the research process. Another reason why key experts were interviewed is the good fit with the characteristics of an exploratory research. The provided information led the researcher to take on other perspectives and include other visions within the paper to shine light on all sides of the nexus. After the key expert interviews gave the researcher a holistic view on the topic, it served as a good basis to develop an interview guide for the other interviews with participants.

In total, six key experts have been interviewed. Three interviewees are working in the humanitarian sector on renewable energy access and climate adaptation. One of the interviewees is working in the financing sector. Another interviewee had an activist perspective towards the nexus and the last interviewee specialized in energy justice.

3.3 Interviews

The next phase of the research consisted of qualitative interviews. A qualitative research approach can be defined as an approach in which non-statistical research techniques are used to find answers to questions concerned with structures or experiences (Hay, 2016). This approach is taken because a profound insight is needed in the behavior towards the nexus between climate adaptation and renewable energy access financing. It is therefore useful to conduct interviews to get a deeper understanding of how adaptation is now integrated and how it can be further integrated into existing funding programs. The target group for the interviews is people working as an implementer of the financing schemes for access to renewable energy within RVO. The programs they are working on should be active in 2022. Purposeful sampling is used, accompanied by snowball sampling, as respondents provided connections to other relevant potential participants. Due to snowball sampling, also interviewees were targeted who are working for the Ministry of

Foreign Affairs, thereby also giving the perspective from the policy maker. The sampling led to a total of 11 participants. This quantity has been proven to be sufficient for two reasons. First, there were not a lot more people that adhered to the criteria to be a participant in the study. When other people within RVO with less experience with the specific topic would have been included, a comparison between the answers would be harder to make. The second reason why this sampling quantity has been chosen, is the fact that within the time available for the research the interviews could be very elaborate. When more participants would have been included, the interviews would be forced to go less in depth due to time constraints. Table 1 shows an overview of the relevant characteristics of the interviewees. Both the time working for RVO as well as the topics the interviewees are most occupied with are mentioned. By acknowledging this data no information can lead back to individuals, but their opinions and knowledge can be placed in a better context. For example, when talking about awareness within RVO an interviewee that has worked in the organization for 25 years can have a different perspective compared to an interviewee who has been working there for several months. To ensure privacy is respected, time frames are used, categorized into four parts: <1 year; 1-5 years, 5-10 years, 10-20 years, >20 years.

Participants	Time within the organization	Most related topics
Participant 1	>20 years	Access to energy
Participant 2	>20 years	Financing related to different topics
Participant 3	>20 years	Energy
Participant 4	1-5 years	Access to energy
Participant 5	10-20 years	Cross-cutting climate topics
Participant 6	<1 year	Access to finance
Participant 7	1-5 years	Access to energy
Participant 8	10-20 years	Access to energy
Participant 9	1-5 years	Access to energy

Participant 10	1-5 years	Access to energy
Participant 11	1-5 years	Access to energy

Table 1 - Characteristics of participants

The interviews were semi-structured, meaning that questions were prepared to align the interviews with the outcomes of the literature review, while at the same time also leaving room for the input of the interviewee. This approach allows for more contextual information as it enables the interviewer to ask deeper questions (Hay, 2016). The AMP framework (Honig et al., 2015) was used as a base for the structure of the interview guide (see Appendix 1). This was done with the aim of seeing how aware, motivated, and proactive the participants are regarding the integration of climate adaptation in the financing programs for access to renewable energy, in order to be able to also define how this behavior can be changed. The interviewees were first asked about their awareness on the topic, both on an individual level as well as on a team level. To start, they were asked about their general awareness of climate adaptation, followed by a question about their awareness of the financing gap between climate mitigation and climate adaptation. Next, they were asked about their awareness of the nexus between access to renewable energy and climate adaptation, after which they were asked about the awareness of these three subtopics within RVO. After this part about awareness, they were asked about their motivation to change the situation to integrate climate adaptation more purposefully in the financing schemes they use. Last, they were asked about actions that can be taken. This gives a good view of the possibility for behavioral change and room for action within RVO. The conclusions that followed from the analysis of the answers can be generalized to other, similar organizations, although the context in which this organization operates should be taken into account before applying the conclusions to other contexts. The questions in the interview all had the same sensitivity, and there were no specific sensitive questions asked. The questions were open questions, thereby creating space for the respondents to lead the interview and give as much relevant information as they wish, as they were not retained by only static questions. This also gave dimension to the explorative character of the research, as information could be provided which could give a lead to new perspectives. The approximate length of the interviews was around thirty minutes.

The interviews were recorded, using a password-protected phone. After being recorded, the interviews were transcribed and coded. For this, both deductive and inductive coding were used by first developing codes that arose from the literature while also creating additional codes that turn out to be relevant. The codes that were deductively derived from literature were based on the AMP-framework (see Appendix 3). This led to three main codes: ‘awareness’, ‘motivation’, and ‘pathways’. ‘Awareness’ included different subcodes, based on the interview guide. These subcodes were ‘awareness of climate adaptation’; ‘awareness of the financing gap between climate mitigation and climate adaptation’; and ‘awareness of the impacts of access to renewable energy on climate adaptation’. It is important to mention that awareness and knowledge are very similar.

In this research, awareness was chosen as a code as it can include both the knowledge that an interviewee has about a topic, as well as the fact that an interviewee is aware of their lack of knowledge. The second main code, 'motivation', consisted of two subcodes: 'intrinsic motivation'; and 'extrinsic motivation'. Last, the third main code, 'pathways', did not have any subcodes. The coding was done by rereading every transcript and using colors to indicate the different codes. Due to privacy reasons the transcripts and the coding cannot be shared. However, the quotes that are used in the findings section are derived from the coded sections within the interviews. By identifying these codes, the findings can be analyzed categorically, and conclusions can be drawn.

By using these different methods, triangulation of this research is achieved. There is one researcher interviewing several participants with similar backgrounds. The data derived from the interviewees can be triangulated. This is called data triangulation (Turner, 2016).

3.4 Positionality and ethical considerations

The positionality of the researcher is an important aspect of research ethics, and crucial to acknowledge as positionality can steer a research project in a certain direction since it places the researcher in the context with their own point of view formed by their own experiences. In this research, the researcher has worked with RVO before, so the organization is already known to the researcher. Therefore, the research and the connections that will be made will not start from scratch, some colleagues are already known. This straddles the influence of an outsider or an insider role. However, the researcher did not perform any work outside the research within the company during the research. Communication with colleagues was limited to the topic of the research and the interviews. All information needed could be collected via the interviews, so besides the advantage of the already existing social network for purposeful sampling, there was a limited information advantage. Another aspect of positionality that should be mentioned is the fact that the researcher is Dutch, which could influence the interviews in such a way that communication is more accessible as the interviewees also speak Dutch.

Because qualitative research methods will be used, including semi-structured interviews, informed consent is also an important aspect of research ethics. An informed consent form will be created in which the research will be explained, anonymity and confidentiality will be guaranteed, and contact details are shared. Before any interview starts, the interviewee has to agree to these conditions and sign the form. Each interviewee can back out of the research when they do not feel comfortable. The interviews will be recorded, and consent must be asked for that as well. The collected data will be stored on password-protected devices. The data that will be used in the research will not be trackable to a specific person. To give back to the participants of the study, the outcomes of the study will be shared, and advice will be given on the topics and issues that were discussed in the interviews and surveys.

3.5 Limitations

There are several limitations to this study. First, a case study is used which places the research topic into a context, but also makes generalization quite difficult. This research is conducted by interviewing participants from only one organization, which makes it hard to state that the findings can be generalized to other organizations. Besides, this organization is based in the Netherlands, which makes generalizing the conclusions to organizations in other countries more complex. The Netherlands has its own political system and political influences, and has another budget than other countries. Therefore, the outcomes and recommendations of this study cannot be identically applied in other contexts, but should be seen in a more general way. However, the methodology of this study could be identically used in other contexts.

Another limitation of this research is the fact that due to time constraints, a quantitative survey could not be performed. This would however have upgraded the generalizability of the data, as more statistical data could have been collected. This could have shown more causal relations between the different elements.

4. Findings

The findings are presented according to the AMP-framework and the interview guide. Therefore, awareness of participants concerning climate adaptation, the financing gap, and the nexus between renewable energy access and climate adaptation, is discussed first. This is followed by motivation in relation to changing financing programs for access to renewable energy to emphasize the adaptation benefits, both intrinsic and extrinsic. Lastly, pathways are discussed, thereby showing specific actions that can be taken to change financing programs for access to renewable energy to emphasize the adaptation benefits.

4.1 Awareness

4.1.1 Awareness of the concept of climate adaptation

The first question that the interviewees were asked, after the general (and privacy sensitive) questions, was what they know about climate adaptation in general. The answers to this question differed from each other but also had some elements in common.

The confidence with which this question was answered varied between the interviewees. Some answered that they did not know a lot about climate adaptation. Within this group of interviewees, some did actually not know a lot about the topic, while the continuation of answers of other interviewees revealed that they actually did know quite a bit. Others answered that they know quite a lot about climate adaptation.

The interviewees gave different definitions for climate adaptation. Participant 1 defined climate adaptation as follows:

'We need to create a soft landing, that is what I know.'

Four other participants specified this and answered in the same line: that adaptation means adjusting the existing world to the challenges of climate change. Two of the participants indicated that the division between climate adaptation and climate mitigation is quite vague and overlapping. Therefore, they did not supply a concrete definition.

When looking at the topics the interviewees related to climate adaptation, one topic jumped out and was mentioned a lot: water. Five interviewees mentioned that they specifically think about this topic both in national as well as the international context, and that that includes both a lack as well as a surplus of water. Another topic that was often mentioned was nature-based solutions. There seems to be a drive to use natural resources as solutions more than unnatural resources. Participant 6 illustrated this by mentioning:

"I think we have to go back and look at natural resources like trees and other plants that provide shadows. Natural shadows offer a lot more advantages than plastic."

Participant 3 amplified this by saying:

“To solve the climate adaptation issues, you will soon end up with nature-based solutions. That is a very concrete and direct solution.”

Besides these topics, extreme heat is mentioned quite frequently.

Concluding, the degree of knowledge about climate adaptation in the team differs quite a lot, although the themes water and extreme heat are mentioned by the majority of the participants.

4.1.2 Awareness of the financing gap

To the question whether the interviewees are aware of the financing gap between mitigation and adaptation and their opinions about that, the answers started quite similar. All the participants acknowledged that adaptation is an important element in order to deal with climate change properly. However, all interviewees also acknowledged that there is more money to be earned in the mitigation sector rather than the adaptation sector, which complicates the enabling of climate adaptation financing. Three interviewees indicated the capitalist economic system as the reason for this. Participant 4 mentioned:

“I think it is way harder to develop a business model out of adaptation. I think that is a bad thing, and that it has to do with the bigger current economic system”.

Participant 6 stated something similar: *“We actually still reason from a capitalistic, profit maximization discourse”.*

Participant 2, who has high expertise in all sorts of financing, explained this in more detail. The interviewee indicated that the private finance, which can be both initiated by the private sector as well as stimulated by the public sector, is only invested when attractive business models are created:

“There is no lack of money in the private sector, but a lack of entrepreneurs that create business models to invest in.”

It can be concluded that there is a collective vision on the difficulty of implementing public financing in such a way that the market for climate adaptation is stimulated.

Another issue that came up when talking about the financing gap, was the complexity of creating indicators to measure the impact of adaptation financing. As climate adaptation is so context-specific and very qualitatively oriented, it is hard to develop quantitative indicators that can statistically show the progress that is made due to the finance. Therefore, the additionality of finance for climate adaptation is hard to show.

Lastly, some interviewees indicated that they see bilateral finance as a very good option to combine the two with each other. Participant 3 stated:

“The Netherlands is one of the frontrunners regarding finance for climate adaptation, but there is still a division between those two branches: mitigating and adapting activities. I think that especially a nexus between the two gives a lot of opportunities.”

Participant 6 said:

“Climate money could be placed in both boxes, climate adaptation and climate mitigation. The money that is spent once has then two benefits.”

Participant 11 mentioned:

“I don’t see why it is a discussion, they are not mutually exclusive. It would be better if we just combine the two.”

There is however an important side note that goes with this statement: participants indicated that they often see this happening but warned that not everything that is called climate adaptation, is actually climate adaptation.

4.1.3 Awareness of the nexus between access to renewable energy and climate adaptation

When the interviewees were asked about the nexus between access to renewable energy and climate adaptation, several things became apparent. One thing that stood out was the fact that some interviewees started getting mitigating and adapting effects mixed up. It became clear that when they were asked about relationships between different concepts, the definitions were not that clear to them and difficult to combine. Participant 5 answered the question as follows:

“We need to handle our energy supply differently, that would make a big difference”

This answer shows that the participant was not very aware of the concept of climate adaptation, as that was not included in the answer. However, when the concerned participants were explained more about the question, interesting answers came up.

The word ‘productive use’ was mentioned by almost all participants. Productive use can be defined as the activities that involve energy services as a direct input to deliver these services (Energypedia, 2022). Most of the respondents acknowledged that energy is just a tool to achieve other benefits, which can include adaptation benefits. As participant 4 mentioned:

“The productive use of energy is as follows: energy is not the goal, it is a tool to do something.”

The most direct adaptation benefits that were mentioned are related to both water as well as to agriculture, like water pumps, irrigation systems, and food processing machines. Furthermore, the prevention of deforestation was mentioned a few times, as biomass is replaced by other sources of energy. More indirect adaptation effects that were mentioned have to do with money. Participant 6 stated:

“Certain technologies cause different CO2 reductions that can be sold as carbon credits. A model can then be designed to work with climate money and give financial benefits to communities.”

Another respondent mentioned that the savings that are made in time due to less time spent on gathering wood, and health costs due to healthier living conditions can be spent on climate adaptation measures.

4.1.4 Awareness within RVO

The awareness within RVO about the three topics discussed in the previous paragraphs is perceived very differently across the participants. The perception that awareness is present within the organization and within the Ministry of Foreign Affairs increases as the function of the interviewee gets closer to a management level or when the interviewee has a management function. Participants that are hierarchically further away from management mentioned that:

“there is no attention given to this topic”

and

“they are often occupied with the daily operations, and do not take the time to stand still and think about these topics.”

Besides, participants stated that they think it is happening in practice, but that the awareness is not really made explicit:

“I think it happens, but it is not present in the way we talk, it is still implicit.”

The interviewees that are working closer to the management level said the contrary. One participant stated that:

“we are moving towards a systematic change, a more holistic approach, and adaptation is on people's agenda a lot nowadays.”

Two participants stated that there are quite some conversations between the Ministry of Foreign Affairs and RVO about these topics, thereby raising awareness. Because of this contrast in answers, it can be concluded that the perception of awareness within RVO has not leaked through enough to reach the more operational levels, potentially caused by a lack of urgency to spread this awareness to lower levels.

4.2 Motivation

4.2.1 Intrinsic motivation

The intrinsic motivation to integrate climate adaptation in renewable energy access financing programs is present within the group of interviewees. Overall, the majority of the interviewees stated that they work on these topics because they have always felt called to do

something about climate and energy issues. However, the amount of passion that comes across from the interviews is varying. Participant 1 stated that:

“By definition, powers should always be bundled when it comes to climate or improving the lives of people in developing countries, whatever includes that.”

It is unclear what Participant 1 means by powers. It could be both governmental or organizational powers.

Participant 6 also showed a lot of intrinsic motivation:

“The fact that energy has such an impact on people’s life: that is why I do the job I do. I think it is very important to contribute to that”.

Participant 3 used the term impact as well:

“I want to make as much impact in the area of climate change as possible.”

These quotes are only a few of all the statements the majority of participants made about intrinsic motivation.

Nonetheless, there is an important side note that has also been mentioned by the majority of participants: sometimes motivation for mitigation is more present than motivation for adaptation. This is caused by the fact that the climate hazards for which climate adaptation is needed are not explicitly felt in the Netherlands yet. A majority stated that they do not really experience any huge climate hazards, which makes it harder to focus on it. Therefore, participant 10 mentioned it is important to:

“Go to the areas in which we have financing programs and really see the needs with your own eyes.”

Another issue that shows that full intrinsic motivation to contribute to the prevention and adaptation of climate change is the fact that employees at RVO are not willing to make all the sacrifices necessary to make that contribution. For example, employees often use airplanes to travel towards different countries, which is not a climate friendly option.

Overall, it can be concluded that intrinsic motivation is very present within the group of interviewees, and it is perceived to be present in the whole organization.

4.2.2 Extrinsic motivation

In contrast with the answers regarding intrinsic motivation, most of the participants stated that there is no specific extrinsic motivation that drives the participants to integrate climate adaptation in their financing programs. A minority mentioned some form of extrinsic motivation though. Especially interviewees that operate on a management level or have a higher expertise in financing mentioned this often. Two types of extrinsic motivations are mentioned: money and external orders to perform certain actions.

Money is the most mentioned extrinsic motivation. A participant who holds a management position stated that:

“the Netherlands could earn quite some money, there is a broad trading perspective by integrating adaptation into energy programs.”

Participant 5 mentioned that they have the idea that money could get people involved who would normally not be motivated to be involved.

The second extrinsic motivation that was mentioned was external orders to perform certain actions. Two participants mentioned that when the Ministry of Foreign Affairs gives an order, this obviously motivates employees to act as that is what their job entails. Besides, participant 2 was strongly opinionated about the presence of intrinsic motivation in an executive organization:

“colleagues say that we have to do our job because the world is on fire, but that is not true: we have to do our job because the Minister wants us to.”

This shows that the political environment, which is steered by culture and other factors, will always play a big role in the motivation to change certain programs in a different direction.

4.3 Pathways

The next question that the interviewees were asked was if they have any ideas about specific actions that could be taken to emphasize the nexus between energy access and climate adaptation. The answers to these questions were both overlapping as well as differing from each other.

First of all, several participants stated that more knowledge is necessary to act in a proper way. Participant 1 said:

“we need a better image of the consequences [of climate change] and how to deal with them. Only then can we figure out where we should connect the different impacts and benefits.”

Participant 4 added:

“We all have some knowledge about adaptation and the nexus, but we need to integrate that into collective knowledge, so that everybody is on the same page.”

To gain this knowledge, it is often mentioned that an expert could be brought in, as a new member of the team or as a workshop giver. This could be both another colleague as well as an external person. This can be done with the aim to increase the knowledge about climate adaptation within the team, and to show the experience of other colleagues within this area. Participant 9 indicated that:

“the topics do not have to be specifically adaptation and mitigation, there is a lot of overlap between these topics, and we can acknowledge that.”

This knowledge could also be gained by increasing the communication between different departments within organizations. The energy department could communicate more with the water department or the food security department. The participants stated several views regarding this solution. Participant 6 stated that:

“We can achieve more when we move across the boundaries of our programs, when we take on challenges in collaboration and with coherence.”

Other participants mentioned that they do not know where to find adaptation experts within the organization, and that due to that fact they struggle with integrating adaptation in their programs.

Besides increasing the knowledge within the team, it is crucial to speak with the Ministry of Foreign Affairs about the importance of climate adaptation. This is mentioned by 8 participants. In the end, the Ministry makes the policy that RVO must implement. The participants in management functions stated that the conversations with the Ministry are moving towards integrating adaptation more. Participants that are having functions including operations within the Ministry stated that the urgency is clear, but that it is hard to develop indicators that can be used to measure progress surrounding these topics. Participant 10 with a more operational role had a slightly different opinion:

“I think it is not that hard to develop indicators, but I think it is hard to establish a baseline from which measurements can take place.”

When specifically looking at the program design, many of the participants mentioned that it is not useful to include questions about or requirements regarding climate adaptation in a project proposal. One interviewee gave the following argument:

“When making climate adaptation a box to tick, it will lose some of the importance attached to it. It needs more attention than that.”

Another participant stated:

“When you ask questions about adaptation in a proposal, you will often get answers that show a lacking understanding of the topic. It is not a solution.”

However, one participant was very clear:

“It does not matter what we do, as long as we do something, mistakes are a part of it.”

5. Discussion

The analysis of the findings will be interpreted and discussed in this section. The aim of this research is to see how adaptation benefits can be more explicitly integrated in financing for access to renewable energy. The research has been built upon the AMP-framework, looking at awareness, motivation, and pathways regarding the nexus to see how behavior can be changed. Therefore, this chapter takes that framework as a basis and combines it with the findings from the interviews and literature. This will lead to both practical and theoretical implications of this research.

5.1 Awareness

In the AMP-framework, awareness is presented as one of the pre-conditions for sustainable behavioral change. Important here is that when a group or team wants to change behavior or decisions collectively, a shared mental model is needed. This means that a team should have the same idea about the same concept. In this specific context, there must be a shared mental model about climate adaptation and the impacts of renewable energy access financing on climate adaptation. The findings show that this is not yet the case within RVO, and arguably also not in other similar organizations. The interviewees did not give the same definition of climate adaptation. Some argued to have a lot of knowledge about the topic, others stated that they lacked knowledge. So, a shared mental model is not really the case.

Literature shows that having access to renewable energy comes with quite some advantages for adaptation. Every technology that produces electricity from renewable sources or that facilitates clean cooking has its own benefits. Biogas facilities can facilitate different options than solar home systems for example. When the participants were asked about these advantages, they often do not have a categorical overview of the adaptation impacts that can be made with the technologies they fund. The participants often acknowledged that they do know general adaptation measures, but not specifically related to their projects. Only some participants are explicitly aware of this; the difference between the interviewees regarding this awareness was huge. Therefore, it would be good to make such a categorical overview and spread that information within teams so that at least the potential impact a project can have is clear.

Data shows that the Netherlands is underreporting climate adaptation finance, so that would mean that it is implicitly making more impact than the financiers are explicitly aware of. This is related to the fact that the interviewees are not completely sure which adaptation benefits are linked to their programs, while the programs often already touch upon certain impacts, like more shade from solar panels. However, a critical note must be made here. Climate adaptation finance is often overreported, and the interviewees were well aware of that. A participant even stated that not everything that is called climate adaptation is actually climate adaptation. So, they are extra cautious before calling action climate adaptation. This caution could be the reason for actually underreporting climate adaptation finance.

To raise this awareness, it is good to keep the three ways in mind in which a shift in awareness can be achieved. These four ways are explained in the AMP-framework. The first way in which a shift can be achieved is shielding. This means that more time and space need to be created for the awareness to increase. This resonates with the needs of the participants. Some participants state that no attention is given to adaptation yet, and that it is a subject that gets lost in the daily occupation of the operations. Without extra time given, there is no room to dive deeper into the topic of adaptation, let alone the nexus. Other participants agree that more room must be made for the integration of adaptation in programs, but then in the form of financial attractiveness. Without a financial incentive, adaptation will not soon be integrated. So, indeed, shielding is a very important factor in the awareness raising. The second way in which awareness can be raised is nurturing, which means making sure that more knowledge is available. This overlaps a lot with the needs of the participants. The majority of the respondents mentioned that they need more knowledge to integrate adaptation in a proper way. Last, empowerment is an important way in which awareness can be increased. This means that besides more time, space, and knowledge, the actors must also be given the authority to decide that adaptation should be a part of their programs. This point is especially relevant for the Ministry of Foreign Affairs, as they develop policies. They are responsible for making big, concrete decisions about the design of the programs. If they want behavioral change towards a better integration of climate adaptation, they should either design the programs that way, or give the implementers the authority to include that in the funding programs. This way, the awareness of the implementers will automatically increase as there is more attention for the topic.

5.2 Motivation

The AMP-framework showed that it is crucial that there is some form of motivation to change behavior, whether that is intrinsic or extrinsic motivation. It appears that there is a lot of intrinsic motivation within the team to make an impact, and adaptation measures are definitely a part of that. So, motivation could be a catalysator for the nexus to have more effect. However, it is important that this is picked up by both the management as well as by the Ministry. This intrinsic motivation is now hard to channel into action, as the authority to make decisions is not appointed to these people. It is therefore good to make sure that this need is facilitated. The form of extrinsic motivation that was most mentioned was having an order from the Ministry to act in a certain way as that is what implementing work entails. So that gives another reason for the Ministry to step up and facilitate the need for adaptation. However, not all the participants were enthusiastic about integrating climate adaptation in their programs right away. There is not a lot of gusto to have another topic on their plate, in the buzz of the daily operations the urgency of the topic quickly fades away. So, facilitation of action is crucial to change behavior and include adaptation more.

5.3 Pathways

It has become clear that facilitation of action is needed to lead the behavior towards more integration of climate adaptation. However, the degree of potential facilitation differs per pathway or action suggested by the interviewees. The need for more knowledge within the organization can be easily facilitated. Experts could be brought into the organization, or the relevant knowledge of other colleagues can be shared. This is not only important because the results show that implementers explicitly mention this need, but also because there is a lot of (implicit) misunderstanding about the topic of climate adaptation and how it can be integrated into programs.

Another often mentioned action is directed more towards the Ministry of Foreign Affairs: they should opt for more integration of climate adaptation into renewable energy access financing. In the end, bureaucracy always plays a role in the actual possible integration of other benefits in existing programs, even if individuals or a complete team are well-willing to make a change. In the interviews, two sides were emphasized. From a bottom-up perspective, it was often said that the participants perceive the importance of adaptation to not completely reach the higher levels in the hierarchy of the organization. From a top-down perspective, it was said that the knowledge and systematic approach towards the nexus does not yet reach the lower levels in the hierarchy of the organization. So, to create a pathway in which everybody can participate and in which the nexus is fully exploited, it is important to reach a collective understanding about the approach that needs to be taken. It is important that persons with management functions stand up and communicate the needs of both the implementers as well as of the donors to reach this collective approach.

One action that could change how adaptation is integrated in renewable energy access financing is the development of indicators to measure the impact climate adaptation measures are making. Literature shows that it is very difficult to create these indicators as climate adaptation is so context specific. However, in case these indicators are created, it helps to effectively integrate climate adaptation into already existing programs. It would be interesting to create a temporary team that dives into the creation of these indicators. This could also be executed per country, to make the indicators even more specific.

5.4 AMP-framework

The AMP-framework is built upon the idea that awareness, motivation, and pathways are all pre-conditions for sustainable behavioral change. Although awareness, motivation and pathways are all related to behavioral change, it is not all needed in order to stimulate behavioral change. If awareness is there, motivation is often coming. But if motivation is there, awareness is not necessarily needed, as people will just do what they think is necessary, even if they do not have the right knowledge available. In the framework, the three elements are not presented as if awareness is a prerequisite for motivation, and as if motivation is a prerequisite for pathways. That fits with this specific context, as that is also not the case within the outcomes of this research. It becomes clear that when the Ministry and the management levels do not facilitate knowledge

sharing and the urgency to integrate adaptation more, there will also be less awareness and motivation. So, developing pathways can also increase awareness or motivation. This model can therefore be applied as a continuous cycle, instead of seeing pathways as the end station. Besides, the cycle can also be turned around, as the findings show that pathways can lead to extrinsic motivation. Motivation can then lead to the urge of acquiring more knowledge, to raise awareness, thereby creating new improved pathways again.

The previous paragraphs show that the three elements are all necessary, but that not every individual should have awareness, motivation, and a plan for action. In the end, it is a collective team effort to integrate climate adaptation more. Therefore, it is important that the three elements are combined, to start emphasizing the nexus.

6. Conclusion

The research question of this paper is as follows: How can the nexus between renewable energy access and climate adaptation be more exploited within renewable energy access financing? The objective of this research was to investigate how the financing gap between climate mitigation and adaptation can be effectively decreased by integrating climate adaptation benefits into renewable energy access financing. A related objective was to analyze how the focus of an implementing organization could shift from being only mitigation focused to being focused on mitigation while also integrating adaptation benefits. This could lead to a triple benefit of development through increased energy accessibility or affordability, climate mitigation and climate adaptation. To answer the research question and to meet these objectives, a qualitative study was conducted. Interviews were taken with eleven implementers of renewable energy access financing programs working at the Netherlands Enterprise Agency (RVO). The AMP-framework was used as a basis for these interviews, with the aim of identifying how the behavior of the team could be steered towards more exploitation of the nexus between renewable energy access and climate adaptation.

It can be concluded that awareness, motivation, and pathways are three important aspects when it comes to shifting behavior. More knowledge is required and needs to be explicitly spread throughout the different levels of an organization. It turns out that knowledge is already implicitly present, so making this explicit is crucial. Time and space need to be made free for this. Besides, support from the policy makers is needed. Awareness about the urgency is abundantly present, as it can be concluded that a majority of the people working in the sector of climate change want to make an impact. Contributing to climate resilience is definitely one of these desired potential impacts. Actions that can lead to a better integration of adaptation benefits into renewable energy access financing are as follows: more knowledge must be brought in the organization; a collective understanding about the nexus and the approach that needs to be taken must be reached; and indicators to measure progress should be developed. Especially the last step could make a big change for the financing gap, as the way of reporting progress could decrease this gap when adaptation benefits are explicitly exploited. As mentioned, these three elements described by the AMP-framework do not have to be present in every individual, but all have to be present in a group as a collective. Besides, the elements are not a prerequisite to each other, but they definitely influence each other.

Concluding, the financing gap between climate mitigation and climate adaptation could be decreased when climate adaptation impacts are explicitly integrated in renewable energy access financing by shifting the behavior of an organization towards this goal.

A recommendation for future research would be to perform a quantitative study on the AMP-framework applied within the context of the exploitation of the nexus in different organizations. This would lead to conclusions that are more generalizable than this explorative study. Besides, more research should be conducted on the adaptation benefits of renewable energy access financing, as the available literature is still quite limited.

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Appendix 1 – Acknowledgements

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Second, I want to thank dr. Meghan Muldoon. She provided useful tips to design a good research proposal, and gave me the basis I needed to develop this thesis into the research paper it is currently.

Appendix 2 - Interview guide

Dutch

Topic 1: Algemene informatie

- Hoe lang werkt u bij RVO?
- Wat is uw functie binnen de organisatie?
- Met welke onderwerpen houdt u zich het meeste bezig?

Topic 2: Awareness

- Wat weet u over klimaatadaptatie?
- Wat weet u over klimaatadaptatie en het financieringstekort?
- Wat weet u over de effecten van toegang tot hernieuwbare energie op klimaatadaptatie?
- Hebt u het gevoel dat er binnen jouw team/RVO aandacht wordt besteed aan deze nexus?
- Zo ja:
 - Worden er moeilijkheden weggehaald?
 - Wordt er kennis gedeeld?
 - Kunnen er andere keuzes gemaakt worden op basis van de kennis beschikbaar?

Topic 3: Motivation

- Waardoor zou u gemotiveerd raken om klimaatadaptatie bewuster in uw financieringsprogramma's te betrekken?

Topic 4: Pathways

- Welke opties zouden beschikbaar zijn om klimaatadaptatie bewuster te integreren in bestaande programma's? Wat zijn de mogelijkheden?

Topic 5: Extra informatie

- Zijn er van uw kant nog dingen waarvan u denkt dat het goed is dat ik het weet?

English

Topic 1: General information

- How long have you been working for the Dutch Enterprise Agency?
- What is your function within the organization?
- With which topics are you most involved?

Topic 2: Awareness

- What do you know about climate adaptation?
- What do you know about climate adaptation and the financing gap?
- What do you know about the impacts of access to renewable energy on climate adaptation?
- Do you feel like attention is being paid to this nexus within the Dutch Enterprise Agency?
- If so:
 - Are pressures moderated?
 - Is knowledge being developed and shared?
 - With the knowledge available, would it be possible to make different choices within the organization?

Topic 3: Motivation

- What would motivate you to integrate climate adaptation more into your financing schemes?

Topic 4: Pathways

- What options would be available to integrate climate adaptation more consciously into existing financing schemes? What would be possibilities?

Topic 5: Additional information

- Are there any other things that would be valuable for me to know?

Appendix 3 - Informed consent form

Informed Consent Form

Thesis title: Climate adaptation advantages in renewable energy access financing.

Thank you for agreeing to participate in this interview. The aim of this interview is to gather information about the awareness of the climate adaptation advantages that are related to renewable energy access financing. Topics that will be discussed in this interview include the awareness, the motivation, and the action within RVO regarding climate adaptation in financing schemes.

This interview will take between 30 minutes and one hour. There are no anticipated risks associated with the participation, but you can withdraw your participation from this interview at any time. The gathered data will be used for research purposes only and will be deleted after the thesis has been completed. This research adheres to the Code of Conduct for Scientific Practice. This informed consent form is necessary to ensure that you agree to the conditions of your participation. Below you can see the consent form, in which you can approve of the conditions.

- The interview will be recorded and transcribed.
- The transcript of the interview will be analyzed, and the findings will be shared in the research.
- The data and results of the interview are made anonymous, and the participant is not traceable.
- The recording of the interview and the transcript are stored at password protected devices.
- Access to the recording and transcript will be limited to the researcher and will only be disclosed confidentially to the relevant individuals within the educational institution (University of Groningen).
- Participation is completely voluntary.
- Withdrawal from the interview is allowed at any time.

- I declare that I have been clearly informed about the topic of the research and purpose of this research.
- I declare that I am voluntarily participating in this interview.
- I understand that I can withdraw from this interview at any time.
- I declare that I agree with the use of the gathered data.
- I declare that I have been able to ask questions about the research, interview, or any related topics.
- I declare that I have read and understood the informed consent form.

If you would like to receive the research project once it is completed, please cross this box:

Participants name:

Participants signature:

Researchers name:





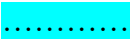


Researchers signature:

Contact details researcher:

Eva Top

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Appendix 4 - Codebook

	CODES	
MAIN	Awareness	
SUB	<i>Awareness climate adaptation</i>	
SUB	<i>Awareness financing gap</i>	
SUB	<i>Awareness nexus access RE and climate adaptation</i>	
SUB	<i>Awareness within RVO</i>	
MAIN	Motivation	
SUB	<i>Intrinsic motivation</i>	
SUB	<i>Extrinsic motivation</i>	
MAIN	Pathways	
MAIN	Relation with BZ (Ministry of Foreign Affairs)	