

New Energy for Uganda

Affordable, Empowering and Sustainable Decentralised Renewable Energy Solutions

Potential of energy communities in Uganda



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1. Summary

Uganda has currently a remarkably low national electrification rate. While electrification has reached almost 43% of the urban households, rural electrification is still very low at 4%. Only 0.4% of the population has access to modern cooking fuel and almost 86% still rely on fuel wood for cooking. The quality of rural life is hampered by lack of electricity, particularly as rural public institutions such as health, educational and water facilities would be able to provide better services if they had access to electricity. Big potential is seen and planned for solar PV and hydropower¹.

Small scale renewable energy community projects will boost rural development and provide the communities with multiple benefits. Contrary to small scale community projects, large-scale energy projects such as hydropower stations hardly focus on the individual situation of local people. Often even if local people are close to the energy grid the (financial) conditions may not enable them to actually access the energy. Thus, energy projects also need to follow bottom-up approaches. As emphasised by Ms. Bärbel Höhn, there is need for both large and small-scale projects as well as a variety of frameworks and approaches to rural electrification in Uganda (as well as in any other country), which are not in competition with each other and operate side by side in a complementary way. Cross-sectional samples in terms of renewable energy sources (solar, wind, biomass, hydro), user needs (electricity, food preparation, lighting, productive uses) can be organized in community management models considering local contexts. Building (prosumer) communities may take longer and may initially be more expensive than giving the floor to private companies, yet, they may be more appropriate, empowering, affordable and sustainable.

There are several challenges to increase local access to affordable and safe energy, such as: high initial investments, lacking quality assurance, lacking awareness of potential business models and technologies. Energy communities are likely to overcome such challenges through their local, bottom-up and member-focused approach. Members of energy communities are more likely to develop ownership feeling, gain access to adequate knowledge and skills as well as network connections. They are not only capable of addressing energy related needs but also cross-sectoral issues such as local environmental protection, sustainable agriculture and capacity building.

In order to implement and strengthen such community structures, a strong civil society is needed, particularly front runners who are keen to be involved throughout the process so that the concept of communities is able to start as a small project on the ground with the potential to be up-scaled in the long-run. However, successful business models, such as energy cooperatives in Germany and Georgia, cannot simply be transferred to Uganda, but can be learnt from and adapted in (rural) Uganda.

While participants of the workshops and round table and Ugandan interview partners agree that there is potential for energy communities, it has been clearly communicated that 'energy' should be part of the solution rather than the solution itself. This means that established, active and willing community groups could be active as 'prosumers' and (potentially already established agricultural or credit cooperatives) could implement an energy component.

¹ HIVOS: Uganda Energy profile (2017): https://www.hivos.org/sites/default/files/uganda_profile.pdf

The local partners conducted a self-assessment in 60 households to better understand the status quo in different rural contexts and thus, the energy demand and usage, (financial) resources and willingness to invest money and time into energy technologies and the establishment of an energy community as well as to identify and understand existing groups and associations and their potential of energy cooperatives. There is a high interest to be engaged in energy communities. For instance, two communities have been identified in district Luweero (coffee cooperative) and in district Kiboga (local women group) where concrete projects could be implemented.

Joint planning and profiling activities of a variety of energy stakeholders which will also result in joint implementations that focus on community ownership are necessary. In June 2018 the participants of the workshops and the Round Table established a “lose network on energy communities” to exchange ideas and have further network meetings and discussions on future steps. The network is managed by ARUWE and has so far approx. 26 members. Interested members of the network came together in Kampala to elaborate on potential business models and pilot projects. As a result of all activities and the establishment of the network, Caritas Kasanaensis, the Coffee Kyalugondo Multipurpose Cooperative and ARUWE will cooperate in joint training activities for citizens to build biogas digesters, use biomass briquette press machines and plan a solar system on the storage building of the coffee cooperative in Luweero.

2. Potential of energy communities

Community energy is the economic and operational participation and/or ownership by citizens or members of a community in a renewable energy project. Local stakeholders own the majority or all of a renewable energy project. The voting control rests with a community-based organisation and the majority of social and economic benefits are distributed locally².

Energy communities are business entities, yet, they do not only focus on profit maximizing. They are able to institutionalize local know-how and structures and empower the communities while generating and improving local value chains. The energy know-how to use and produce local energy will be constantly built up and will benefit the whole community due to knowledge exchange and trustful cooperation. Cost reductions have made renewable energies more economically competitive in relation to traditional fuels, yet, social and structural changes are needed, which could be boosted by energy communities.

Energy communities show the following opportunities and challenges:

Opportunities

- **Rural development:** climate mitigation, health and time benefits, better living conditions with economic activities, enhanced social capital and local identity
- Linking with **existing structures** for productive use of energy

² IRENA: COMMUNITY ENERGY: BROADENING THE OWNERSHIP OF RENEWABLES (2018). http://coalition.irena.org/-/media/Files/IRENA/Coalition-for-Action/Publication/Coalition-for-Action_Community-Energy_2018.pdf

- Setting up **local business models and 'bankable projects'** through local production units, e.g. for stoves and biogas
- Mobilising and Integrating citizens in **sustainable economic processes**
- **Awareness raising** for access to more economic, sustainable and healthier energy
- **Knowledge transfer on Management and Technologies**, such as stoves, solar, biogas
- **Setting up training centres**, e.g. for solar and biogas
- **Acceleration** of energy access and renewable energy deployment rates
- Keep knowhow and young people in community
- **Initial funding** could be provided to strengthen existing structures and boost self-sufficient sustainable development
- Large interest of **different stakeholders** to address cross-cutting issues and ensure sustainable process
- **Bridge the gap between small scale projects and private sector** interests through better management of projects
- Increase in actor diversity results in shared decision-making and enhanced **transparency, trust and governance**
- **Cooperative policies** and examples in place
- Regional networks, partnerships and potential South–South and North-South **cooperation ensure sustainability**

Challenges

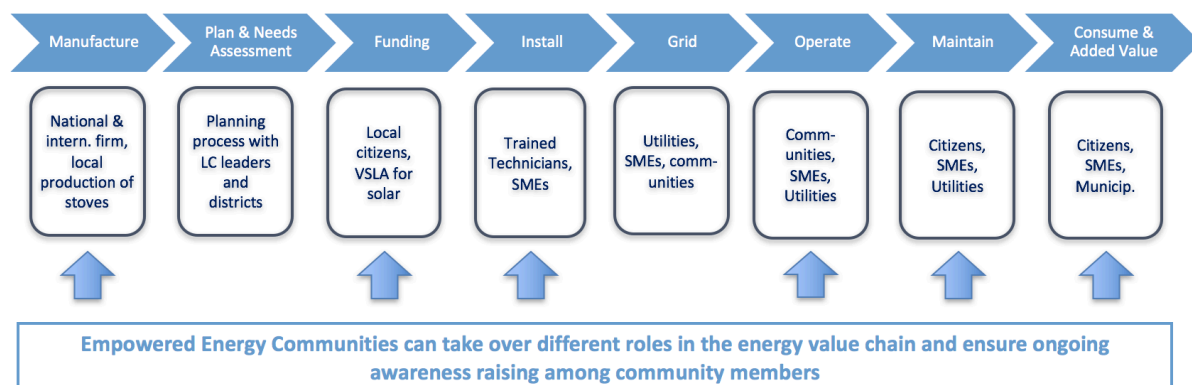
- Formal group establishment as 'prosumer' cooperatives is administrative hurdle
- Historically rather negative reputation of (producer) cooperatives
- Lack of successful pilot projects
- Low individual and household income
- Lack of knowledge and management and financial skills
- Lack of critical and analytical thinking
- Taxation on solar accessories has been maintained. This makes access to solar still costly.
- Implementation of further policies and bureaucracy
- Sometimes too high expectations on economic development: missing on providing real business development opportunities.

Needs

- Including local people into development and planning stage of (energy) community projects
- Capacity building (awareness raising, mass sensitisation, re-branding, inclusive training on technologies and business operations)
- Exploit existing knowledge and create dialogues on the ground
- Knowledge exchange through South-South and North-South cooperation
- Free will crucial and common goals and interests among participants to be identified
- Effective legal framework, political will and government backing
- Quality insurance (end user protection, self-regulations, partnerships)

Energy communities can bring advantages on various level: On **local and individual level** they provide access to affordable renewable energy and improved services, such as health and educational services, for all. They empower community members with trainings on technical, economic and procedural know-how and keep know-how and youth in the communities. Added values can be generated by using locally produced energy for food and agro processing. Thus, members as producers and consumers ('prosumers') will be involved in economic activities and benefit financially from dividends as well as social, cultural and environmental benefits which are guaranteed due to the core values and principles of cooperatives and communities. A main focus can be given to women's empowerment. Young people are engaged in their communities and integrated models can start small and expand steadily. Good practices can be replicated and shared. Within energy communities, beneficiaries and the implementing organization can be the same actors. This strong interaction generates a sense of ownership and commitment and involves local and regional institutions. On **community / municipality level** empowered citizens bring more social and economic impact and support their communities in protecting nature and in dealing with climate change. On **national level** energy communities are able to support the efforts in meeting NDCs (Paris Agreement) and SDGs (Sustainable Development Goals, Agenda2030). The activities will initiate and develop a successful market for decentralized energy production and distribution.

Members and energy community groups can participate in the whole energy value chain and accelerate the access to affordable energy in rural regions. The level of involvement depends on experience and interest of the communities and members. It can start with small projects and can be up-scaled with increased experience and resources.



Actions to promote energy communities in Uganda:

As below-mentioned there are already successful energy communities in place. Given the needs and the expertise of the partners, technologies can be implemented in a target-oriented way for 3 main purposes:

- **Energy saving stoves for cooking** can improve livelihoods of many households. Energy saving stove can be built by household members – trained and monitored by experienced energy communities. Although it would be preferable and technically possible that most of the households use biogas for cooking it is a first important

step to demonstrate alternatives to change behaviour patterns, reducing the use of the unhealthy and non-sustainable “3-stone-technology”.

- **Biogas and solar for households** provide energy for lighting, cooking, water pumping, TV, phone charging etc. The prices are very attractive and competitive compared to



Energy saving
stoves
Cooking

Biogas and Solar for households
Lighting, cooking, pumps, fridge, TV,
charge



Joint energy production, use on
community level
Irrigation systems, schools, building up
business, coffee coops, agro coops

kerosene or charcoal. Energy communities can get better prices (economies of scale), care for installation and provide local maintenance and repair services, expertise and skills required to sustain the technical systems

- **Joint energy production for new or existing communities** can improve quality and reduce prices of technologies and energy consumption, save time and make communities independent of non-sustainable and fossil energy supply.

3. Project objectives and main activities

In the context of the Marshall Plan with Africa, the 8-month-project by WECF, ARUWE and BENG aims to bring together energy community stakeholders from Uganda and Germany to analyse the transformative potential, success factors and challenges for the implementation of energy communities in Uganda. Thus, the project seeks to contribute to the electrification of rural areas and empowerment of existing (inclusive) communities and networks through their access to and control over (already successfully established decentralized) clean energy technologies and through their engagement in potential business activities. The concept of cooperatives and communities is investigated as a potential framework for such activities since it offers a bottom-up approach that includes both women and men in planned (economic) activities, which will be piloted in multiple rural areas, such as Kiboga and Luweero, for the assessment of local impacts and up-scaling potential to other areas in Uganda. Young women and men will be qualified in technology, management, leadership and financing RE projects.

Overall the following activities were conducted within the project:

- **2-day-capacity building workshop** with NGOs, beneficiaries, UNREEA, DGRV, HIVOS, FINCA, etc. (approx. 30 participants)
- **High level round table** with Ms. Bärbel Höhn, GIZ, German embassy, KfW, Ugandan Ministry for Energy and Mining, UNEEEA (40 Participants)
- **Training of trainer (ToT)** for biodigesters, water tanks, solar (17 participants)
- **Self-assessment** of 60 households on energy needs via survey
- **Second workshop and establishment of loose network** for regular exchange, managed by ARUWE (approx. 25 members)

- **Field visits and meetings** with saving and agriculture communities and bishop of diocese Luweero
- **Development of energy community models** for existing groups and communities
- **Informal discussions with German energy cooperatives** on potential “South-North-cooperation between German energy coops and Ugandan energy communities.
- **Final report**

The project highlight and kick-off was the two-day capacity building workshop as well as a high-level round table meeting in Kampala organised by WECF and ARUWE on the 12th and 13th March 2018. Participants included the German ambassador for Africa Ms. Bärbel Höhn, a representative of the Ugandan Ministry of Energy John Tumuhimbise, GIZ, SNV, KfW, UNREEEA, UCA and a variety of energy companies and civil society organisations. Both the capacity building workshop and the high-level round table meeting aimed to share lessons learnt from local energy community projects in Uganda and international energy cooperatives/communities, to identify current capacities and needs in rural areas, existing legal cooperative/community frameworks and to discuss a potential cooperation between Uganda and Germany in order to achieve the national energy and climate goals of Uganda.



Group photo at the High-Level Round Table in Kampala.

4. Current situation and strategy for energy supply in Uganda

As part of the five-year National Development Plan (NDPII³, 2015/16 - 2019/20) and the National Climate Change Policy (NCCP⁴), Uganda has addressed climate change challenges and

³ Republic of Uganda: Second National Development Plan (NDPII) 2015/16 – 2019/20 (2015): <http://npa.ug/wp-content/uploads/NDPII-Final.pdf>

⁴ Ministry of Water and Environment: Uganda National Climate Change Policy (2015): <http://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf>

potential ways forward to achieve an environmentally friendly, economic and socially sound development in the frame of Uganda's Vision 2040. With the aim to achieve a renewable energy consumption increase from 4% to 61% in 2017 (18% in 2017), as agreed in the Renewable Energy Policy, the Ugandan government pursues ambitious goals, with the current renewable energy policy still under review. While large hydropower schemes dominate the scene, various policies and programmes are under discussion.

During the high-level round table in Kampala the Off-Grid Electrification Master Plan was introduced by John Tumuhimbise, representative of the Ministry of Energy in Uganda, which in addition to the rural electrification strategy and plan, aims to identify feasible areas for off-grid solutions since it has been recognised that grid extension is more expensive. With an appropriate guideline, which is still in the development phase, the government intends to push holistic mini-grid solutions through public and private actors as well as public-private partnerships. Mini-grids will particularly be favourable for islands on Lake Victoria where about 1000 people live and where the private sector has been involved to provide suggestions and business plans, two of which will be implemented this year.



John Tumuhimbise, Representative of Ministry of Energy in Uganda.

There is common understanding that lack of access to energy and electricity severely constrains the economic development of rural areas, preventing the establishment of businesses that require electric power or forcing companies to buy diesel or petrol generators that are costly to operate and negatively impact the environment. Furthermore, job creation is being seriously constrained by the lack of adequate investment in the provision of rural infrastructure services, of which electricity is a key component. Lack of electricity also prevents access to information and communication technologies (e.g. mobile phones, computers, internet). Further, the quality of rural life is hampered by lack of electricity, particularly as rural public institutions such as health, educational and water facilities would be able to provide better services if they had access to electricity.

Since decentralised renewable energy solutions still face challenges, such as high initial costs and lacking local skills, the following solutions were suggested: subsidies should be provided and concessional financing to lower the end-user tariff, there is need to promote productive use of energy in rural communities, capacity building for operating and maintaining technologies, hybrid systems for decentralised energy solutions as well as having them connected to the grid. Thus, the Government of Uganda has recognised the need for off-grid solutions to complement grid based electrification, particularly in rural areas where the population is sparse and grid extension is not feasible.

5. Energy communities in Uganda

5.1. The Role of Energy Communities

With the new initiative “Green people’s energy for Africa” by the German Federal Minister for Economic Cooperation and Development (BMZ) and therein the potential Ugandan-German cooperation for decentralized rural energy solutions, energy communities and cooperatives play an important role to meet Uganda’s climate and energy goals. Public participation is seen as a necessity for achieving Uganda’s electrification targets through the development of citizen energy. This requires the expansion of the role of energy consumers, towards their integration into (and potentially control over parts of) the value chain of energy supply. Hereby, consumers can take over different roles and responsibilities by becoming co-developers in the planning stage, co-producers and/or co-distributors.

5.2. Existing energy community projects in Uganda

Since there is a necessity to understand already established and functioning energy community projects in Uganda, several cases were introduced during the workshops and round table held in Kampala, such as running programmes by GIZ, KfW, SNV, ARUWE, FINCA, Solar Sisters, Climate Justice for Women and Children, Defence for Women and Children, and the Ugandan Solar Energy Association (USEA).

- (1) While GIZ Uganda introduced their current projects, such as PREEP (Promotion of Renewable Energy and Energy Efficiency Programme), BMUB (Promotion of Global Carbon Markets in Uganda) and EnDev (Energising Development), the main focus of the discussion was on the Pro-Mini Grid programme, which plans to implement 40 mini-grids by 2020. Thus, together with the government, GIZ is setting up a framework for large mini-grid projects in northern and southern Uganda. The main focus is on working with private companies which will operate mini-grids in future, on training locals to become technicians in order to shorten distances between end users and technology suppliers as well as on including local governments to contribute in terms of mobilisation, security and land acquisition. The process is as follows: Assessments of the status quo and capacities of chosen communities are done to identify the potential demand and electricity usage which helps to design technologies to the villagers’ needs, usability and financial resources. Private companies, which will have to bring their own investments, are then chosen and subsidies agreed. Finally, private companies will install the technologies, villagers will be trained and the progress on productive use will be monitored.

The reason why GIZ focuses on the private sector is mainly because private investments increase commitments, companies have stronger technology and operation capacities compared to local people so that they are able to monitor already installed systems and also have access to updated systems; they can access financial resources quicker and thus, are able to push for progress through innovations as well as competition which eventually will lower end user tariffs.



GIZ Representative on the potential role of communities throughout the value chain.

The role and strength of communities are seen in establishing community groups (e.g. farmer, credit and women groups) in order to access resources, to produce (e.g. crops, cotton), to contribute with labour and land, and especially to add value to their production for profit generation. Value is, however, added through equipment that often requires electricity which should be provided by the private sector and then managed and maintained by communities. However, a community is also likely to need support with funding practices, access to and testing of new types of seeds which for instance are more resistant to pests or droughts.

- (2) KfW Development Bank tends to put their focus on large-scale energy projects, such as energy production through hydropower plants ('co-financing a 250MW hydroelectric power plant') and energy distribution through extended infrastructures ('supporting the construction of high-voltage and medium-voltage transmission lines and promoting new power connections in rural areas'). Since off-grid solutions have taken up at a fast rate, more off-grid projects are under preparation, yet, they will rather be of large-scale.
- (3) Since there are about 2.9 million people who own animals in Uganda, the development organisation SNV has worked on the dissemination of household biogas. SNV has reached 7000 households which use the biogas for cooking and lighting while the slurry is used for kitchen gardens or for further income generating activities such as for (fodder) crops, mushroom and/or fish farming. The focus has not only been on biogas plants, but on promotion and awareness raising, capacity building, citizen involvement and organisation (e.g. farmer groups) which play crucial roles due to high up-front costs for biogas systems. The value chain has been taken over by a variety of stakeholders such as individuals and community based organisations as promoters, microfinance institutions for loans and technical service providers for installing the systems.
- (4) Based on a South-South exchange with India the NGO ARUWE has implemented biogas systems that are both environmentally friendly and inclusive for women and men. Thus, women are involved in the construction process by weaving bamboo baskets (rather than using bricks) as a foundation for bio- and water tanks. Hence, several local individuals and female groups have been trained and involved in the planning, construction, maintenance and promotion of the biogas systems. Furthermore, established female groups come together to spread awareness on health and energy issues and generate income from small businesses, such as soap making. ARUWE has introduced the Village Savings and Lending Association Plus concept. Women are able to save resources which are used to support internal lending, including financing for basic energy packages. ARUWE has made sure that along the bio gas value chain, women are participating and beyond accessing energy, they are in position of generating income, for instance by weaving bamboo baskets for the biogas plants.



ARUWE's demonstration farm with bio- and water tanks made out of bamboo.

- (5) As an international microfinance institution FINCA provides flexible individual or group loans for purchasing solar products (among other things). While FINCA mainly focuses on the financial side, their sister organisation Bright Life offers technologies through FINCA loans and pay-as-you-go schemes. The pay-as-you-go scheme does not require a bank account or an access card, thus, customers pay 15% deposit on mobile money to register for the scheme and are then able to get the required technologies and use them depending on how much money they top up (e.g. for 3 days). This is an advantage since accessing financial cards costs about UGX 30.000 and each time the card is used to borrow a loan UGX 17.000 has to be paid, which is a lot if a loan of UGX 140.000 is taken (which is about the price for a solar product). Thus, after holistic assessments are done (electricity demand and daily life activities), customers (mainly active in agricultural activities) get access to solar lights, charcoal stoves etc. through FINCA and are trained on product use and income generation strategies by Bright Life.
- (6) Solar Sister aims to tackle energy poverty by training women to become entrepreneurs, selling clean energy technologies, such as solar lights, efficient cooking stoves and phone charger. They have established a network of women based on trust and respect, which is likely to foster synergies, such as getting access to soft loans (micro-credit) as a group in order to purchase solar lights. Community members are also trained to install and maintain the equipment. This is a necessity since those beneficiaries live off the electricity grid and even if they would live near the grid, they are not in a position to afford hydro-electricity.
- (7) Climate Justice for Women and Children (CWC), implemented a pilot Solar PV system for rural women and have reached 120 households. Rural Households use Kerosene lamps and charge phones at the trading centres, spending over UGX 1000 per day. CWC introduced Solar PV systems (Pico and Solar Home systems) where rural households acquire the solar systems and are allowed to pay in instalments for 1 -2 years, depending on the size of the system. CWC, with technical support from the Ministry of Energy and Mineral Development, Rural Electrification Agency (REA) and other partners, trained leaders of women groups to raise Solar PV awareness and sell the solar lanterns through

their groups and cooperatives. Women group leaders are trained on how to run successful solar businesses and to become entrepreneurs, how to raise awareness on Solar PV and how to install and provide maintenance services for such solar systems. These networks have helped to extend the outreach to rural communities, providing an opportunity for local partnerships for businesses and women employment.

- (8) Defence for Women and Children and Christian Off-grid Energy Ltd are also involved in solar PV systems, using micro financing. The total cost of the energy technology is divided into equal instalments to empower low income earners to pay in instalments over a period of 12 - 24 months. Particularly women as a group in the Rakai District acquire solar system of 20Wp for lighting 4 bulbs Charging Phones and powering Radio at cost of UGX 300.000. Yet, the decision making process is done by Defence for Women and Children and local leaders, and the installation is done by a hired energy company Christian Off Grid Energy Ltd while the maintenance is done by local village based trained technicians.
- (9) Uganda Solar Energy Association (USEA) aims to bring all solar dealers onto one platform in order to regulate the provision of genuine solar products. Thus, all technicians must have a certificate to ensure that everyone in the solar business has the skills to provide, install and maintain solar panels. This would avoid fake products and insufficient service.

Shared projects have shown that there are already successfully established local structures which utilise different energy sources such as hydropower, biogas, solar and geothermal energy as well as hybrid solutions. As identified in a survey conducted by UNREEEA (Uganda National Renewable Energy and Energy Efficiency Alliance), most (renewable) energy companies in Kampala focus on solar products (below 100kW) and cooking stoves (sometimes combined with other products such as briquettes) while companies outside Kampala offer mainly biogas for household and commercial activities (with an increasing demand for solar products). Energy companies, sometimes in cooperation with civil society and (governmental) development organisations, provide energy access to households, public institutions such as schools and clean energy service centres. Still, 90% of the population in Uganda lack energy access and depend on biomass (for example, 78,6% of the population use firewood). Firewood for cooking and kerosene for lighting are not only expensive and unsustainable, but they also cause health problems and environmental degradation which has increased droughts and exacerbated climate change. There is the desire to have household energy access to have lighting, listen to radio or watch TV, or have at least access to charging centres to charge phones. Furthermore, energy could be used for productive activities such as for cooling dairy products or drying crops. With the access to energy the establishment of more enterprises would be supported. In order to address current issues as well as desires and needs, renewable energy solutions become a necessity. Yet, based on the introduced projects, several existing challenges have become prominent.

5.3. Challenges of existing energy community projects in Uganda

- **High initial investment:** Expensive designs and technologies often require partnerships and the establishment of community groups to access loans and the concept of cost-sharing (e.g. a farmer pays back loans in milk units). Mechanisms are needed to ensure that people will pay back loans. Furthermore, according to UNREEA's survey, more than half of the

interviewed energy suppliers (181 in total) are solely self-funded and only few know about existing funding opportunities, illustrating that access to finance is a major challenge for companies.

- **High regulations and complexity:** Since mini-grids are highly regulated by the government quite complex structures are needed, which means that mini-grids have to be licensed, high initial investment is required (with pay-back insurance), particular amounts of tariffs need to be charged and regulators pleased. In order to enable rural people to access electricity GIZ works with the government and donors to provide subsidies to reduce costs of end users.
 - **Quality assurance and capacity building:** Provided technologies often lack quality while technicians seem to lack sufficient skills. Sometimes even if technicians have a university degree they often do not have hands-on experiences. While there are formal qualification systems which are three month long part-time courses provided by the government, many people choose informal processes that are not accredited. In order to increase trust of local people qualifications and certifications need to be harmonised. UNREEEA's survey shows further that many energy companies lack substantial basic business knowledge, and for instance do not have a (complete) business plan and face inadequate skills in marketing.
- 
- Group discussions at the challenges of existing energy community projects in Uganda at the workshop.
- **Awareness:** Local people still need to be sensitised to the personal and environmental impacts of using biomass as well as the benefits and economic feasibility of acquiring renewable energy technologies. 'Centres of excellence' with demonstration models were suggested as potential communication tool for raising awareness, finding partners and increase knowledge about markets and access.
 - **High transportation costs:** Particularly if energy projects are implemented outside of Kampala, energy companies face high transportation and distribution costs, e.g. supply of equipment for instalment and maintenance.
 - **Sustainability:** Projects need to be economically sustainable once donors stop financial support and capacity building. Holistic approaches are aimed for so that energy access needs to be combined with profitable business activities.
 - **Inclusiveness and partnerships:** Due to different expertise and accessibility, cooperation between a variety of stakeholders (e.g. private sector, civil society organisations, local authorities and affected community members, particularly women) is needed. Women in particular often dedicate their time to family and household duties rather than attending workshops.
 - **Policies:** Clear policies which can serve as effective frameworks for the supply of renewable energy are lacking to enforce standards (while other participants argue that progress also

needs to be made without established policies).

- **Carbon Fund:** The Uganda carbon bureau was established to provide practical advice and support project developers, carbon credit buyers, development agencies, financiers and others to understand climate change, global warming and carbon emissions trading markets. The gaps are: information is not in the public domain, lack of start-up funding, low levels of technical and experience, bureaucratic processes and high transaction costs.
- **Continuity:** A continuous process of development and re-assessment of local situations and capacities as well as of provided institutional support is often lacking. Some interventions depend on donor support and project lifetime; sustainability mechanisms have not been instituted. This greatly inhibits continuity. Sustainability models have not been developed.
- **Scaling-up:** The projects are often donor driven. The initial investment outlay is quite high for communities to scale up. Access to energy financing has limitation mainly tagged to costs. Community energy has not fully been integrated into the mainstream energy supply chain, this inhibits financing and attracting investment.
- **Taxation:** Taxes on solar panels were scrapped but it was maintained on other accessories like batteries. This still keeps the costs high. This is because it is hard to distinguish them from other electronic gadgets by Uganda Revenue Authority Officers.
- **(Formal) Framework:** Informal (women) groups have established for group benefits, such as access to loans to engage in productive activities, while, considering their engagement and willingness, their progress could increase being part of an effective formal framework. Furthermore, people might come together to access loans and energy, but communities coming together as producers and consumers does not yet exist.

6. Principles of International Cooperative Alliance (ICA) for cooperatives

Cooperatives could be an appropriate organisational form for energy communities. There is cooperative framework in place in Uganda, but the concept has bad reputation due to former negative experiences and misuse of this democratic model. Overall the 7 principles of ICA are interesting and important for energy communities:

1. *Voluntary and Open Membership*

Co-operatives are voluntary organisations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.

2. *Democratic Member Control*

Co-operatives are democratic organisations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary co-operatives members have equal voting rights (one member, one vote) and co-operatives at other levels are also organised in a democratic manner.

3. *Member Economic Participation*

Members contribute equitably to, and democratically control, the capital of their co-operative. At least part of that capital is usually the common property of the co-operative. Members usually

receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their co-operative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the co-operative; and supporting other activities approved by the membership.

4. *Autonomy and Independence*

Co-operatives are autonomous, self-help organisations controlled by their members. If they enter into agreements with other organisations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their co-operative autonomy.

5. *Education, Training and Information*

Co-operatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their co-operatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of co-operation.

6. *Co-operation among Co-operatives*

Co-operatives serve their members most effectively and strengthen the co-operative movement by working together through local, national, regional and international structures.

7. *Concern for Community*

Co-operatives work for the sustainable development of their communities through policies approved by their members.

Due to cooperatives' core values, which strengthen local empowerment, inclusiveness, development, acceptance, financial resilience, cooperation and sustainability, cooperatives are likely to contribute to the supply of renewable energy as they have done in Germany. Cooperatives are economic models that are similar to stock exchange companies, yet their target is not to maximise dividends but to foster social, ecological and economic needs of their members and can rather be seen as a social initiative. They are also not only more democratic, because, independent of the numbers of shares, each member has only one vote to determine the strategies of the cooperative, but due to agreed quotas, women can be empowered to take up to 100% of the member's seats and run the cooperative, depending on the agreements in the charter.

7. Best Practice / Examples

7.1. Energy Cooperatives in Georgia

Also in rural Georgia energy poverty is widespread. Around 30% of the income is spent on energy consumption. Together with local partners, WECF established energy cooperatives at the local level. While capacity building and facilitating was the main focus of the initiative, the investment had to be made by individual households (no subsidies were provided). Members of the local energy cooperatives are local technicians who install and maintain solar systems. However, all citizens can become members and benefit from the access to the technologies, to consultants and to financial mechanisms with local banks so that non-bankable individuals/households are able to access loans since it is guaranteed that the technology is of high quality and households will save enough money through the technology. Furthermore, the aspired ownership of the technologies motivates members to pay interest and the amortisation since otherwise the solar systems continue to belong to the cooperative. The

supervisory and manager board, which are democratically elected, also have good knowledge about the financial situation and are in communication with banks and other stakeholders. Local cooperatives also set up an umbrella cooperative in order to deal with marketing issues, qualification and certification as well as (mass) purchases to benefit from economies of scale, but also to attract (international) investments due to established trusted structures.

7.2. Energy Cooperatives and Gender Justice in Georgia

Similar to the situation in Uganda, also Georgian women bear the main burden of energy poverty since they are, for instance, also responsible for collecting firewood – time that could be spent on economic activities – as well as for cooking and heating with wood – which causes health problems. Women are therefore actively involved in the cooperatives in Georgia due to a variety of gender strategies, such as management training, awareness raising on the

importance of equal participation for women and men, as well as the introduction of women quotas. For instance, at least 40% of the board members have to be female, which requires capacity building for women on technologies, management and marketing. Furthermore, women who already use solar water heaters and efficient cooking stoves are trained to be energy ambassadors to convince other women and households to install such technologies. As change agents they then receive a commission, which has been a successful mechanism to spread the benefits and knowledge of the technologies. Since women often do not have control over or access to household finances, they are also allowed to do in-kind contributions, such as providing food for technicians, in order to enable everyone to become a member. Economic, environmental and social benefits have been achieved since the beginning of this initiative.



Katharina Habersbrunner, BENG and WECF.

While German and Georgian models cannot simply be transferred to Uganda, they can be learnt from and adapted in rural areas in order to empower local people, provide employment and perspectives for all generations. Building (prosumer) cooperatives, according to Ms. Bärbel Höhn, may take longer and may initially be more expensive than giving the floor to private companies, yet they may be more appropriate, empowering, affordable and sustainable. In Germany, small-scale energy projects, such as by energy cooperatives, have hugely contributed to the German energy transition from fossil fuel and nuclear energy towards more renewable energy production.



Ms. Bärbel Höhn, German ambassador for Africa.

8. Establishing energy communities in Uganda

8.1. Opportunities of establishing energy communities

Besides wider positive impacts such as climate mitigation, health and time benefits, better living conditions through economic activities and enhanced social capital, participants agree that there is a large potential market for energy communities in line with other existing cooperatives such as agricultural or credit cooperatives and based on already established legal frameworks. Furthermore, there are existing local structures in terms of established informal community groups (and even more specifically women's groups) which can be transformed into formal actors as well as existing governmental structures (for example, cooperative policies), showing that there is no need to start from scratch. It is also not only the case that initial funding could be provided to boost self-sufficient sustainable developments, but that the successful establishment of trusted cooperatives is likely to attract further funding from the (international) private sector to ensure up-scaling effects as well as knowledge transfer on technologies and management.

8.2. Overcoming challenges of establishing energy cooperatives

Although devices to harness energy are available and access to such devices is possible through informal group formations, communities have not yet come together as producers and consumers (prosumers) but rather as consumer groups while cooperatives have rather come together as producer groups. Also considering the history of cooperatives, people who were affected by losing assets in the past are likely to distrust the concept of cooperatives while young people may not even know about cooperatives. Further general challenges include remoteness of rural areas, inadequate resources and low individual or household incomes and the potential failure to pay back loans, lack of knowledge and skills, negative mind-sets and no critical and analytical thinking, cultural and historical issues, taxation (especially when it comes to purchase of solar where other accessories beyond the panel are still taxed), and the lacking implementation of policies. Yet, most of those challenges are likely to be overcome through the establishment of communities or cooperatives. And as further discussions have shown, particularly cooperative policies are already in place, but are, as mentioned, subject to disturbed historical experiences and thus, require mass sensitisation.

8.3. Needs for establishing energy communities in Uganda



Father Hilary Muhezangango

Most importantly people on the ground, who will be implementing new ideas and cooperative frameworks, need to be involved in the discussions and development of clear strategies. As mentioned, due to unawareness and historical development people may mistrust cooperatives so that there is an initial necessity for mass sensitisation and re-branding of the concept and awareness raising of its advantages. For the establishment of a cooperative or community, common goals among diverse groups need to be found which is highly likely since people are already coming together for different reasons, such as for access to finance. Besides awareness raising, there is a high need for inclusive capacity building on technologies and business operations. It is important to exploit

the knowledge that is already existent within Uganda and within districts and local communities which means dialogues and exposure are required. Further knowledge exchange through South-South cooperation as well as cooperation between Uganda and Germany may be an option. Furthermore, effective legal frameworks and government backing will help to establish trust of local people and push the idea of cooperatives. In this context, a highly sensible topic is quality assurance which needs to be formal, universal and effectively in place for end user protection, self-regulation and trusted partnerships.

8.4. Key players for establishing energy communities in Uganda

Key stakeholders are first of all end users and therefore community members and village leaders, as well as NGOs, CBOs, religious institutions, microfinance institutions, academia and research institutes, energy companies, local and national government bodies and international partners. A successful cooperation of existing and new partnerships will foster experience exchange and increase transparency and trust. Therefore, a loose network of “community energy stakeholders” was initiated and has been managed by ARUWE.

9. Trainings of Masters for technologies

ARUWE promotes off-grid renewable energies, such as green biogas technologies, improved energy efficient charcoal/firewood cooking stoves and the dissemination of solar (Pico & Home) systems. The project has successfully increased the usage of off-grid renewable energy technologies in rural areas, which have not been served by the national Grid (UMEME), to improve their standard of living and health. This has been done through enhancing the capacity of community based technicians (Masons/masters), energy saving builders, and solar PV technicians to handle off grid renewable energy technologies in the District Kiboga and also to strengthen the capacity of ARUWE in energy project implementation, marketing and monitoring while also creating employment.

ARUWE conducted a 5 days' practical training on the basics of off grid renewable energy technologies for 3 categories of technicians i.e. biogas technicians (Masons), energy saving builders, and solar PV technicians. The trainings involved both theory and practical activities in the field, which enhanced learning and practicability. The trainings gave the technicians skills and knowledge they needed to construct, install, maintain and market green biogas technology, energy saving stoves and solar technology. They were conducted at ARUWE demonstration centre.

Trainees were carefully selected using simple criteria;

- Technical ability / skills- in general people who were already working in a similar field
- Motivation was also important. Experience has shown that people without previous skills but who are willing to learn can also succeed.
- Gender: Young women and youths were encouraged to attend trainings

ARUWE mobilized 17 interested masons of whom 9 were young women. Two consultants were also identified in addition to the trained masons who facilitated the trainings. During the practical trainings, the trainees were divided into 3 groups and everyone was given the chance to try out all three technologies. ARUWE has continued to provide ongoing support and training by involving the trained masons in ongoing construction work, mentorship and

coaching to ensure that the trainees get more exposure and experience. More follow up training sessions are needed for the masons to master the skills.

10. Establishment of informal network

In the frame of the second capacity building workshop in Kampala in June 2018 possible business models for energy communities were discussed and an informal network on energy communities in Uganda was set up.

The informal network aims to bring together energy and cooperative stakeholders from Uganda to analyse the transformative potential, success factors and challenges for implementing energy communities, to share experience and to implement concrete community projects.

Emphasis is put on decentralised renewable energy solutions which empower local communities to play an active role in energy production, distribution, marketing, maintenance and or other business activities.

It was agreed that

- ARUWE takes over the organisation and coordination of the network. ARUWE leads documenting and sharing the informal network activities. Members of the network are mainly in contact via emails and meetings.
- The network works the following issues among others
 - Possible business models for energy communities
 - What are the needs and capacities of energy communities and how do they might differ between regions?
 - What kind of capacity building is necessary to empower communities and their members to take over some responsibilities in the energy value chain?
 - How could a collaboration between Ugandan energy communities and German partners work?
 - Which stakeholders (e.g. cooperatives, municipalities, existing formal and informal local groups and other decentralized actors) should be involved in the network and/or dialogue?
 - How could communities and citizens be mobilized to plan, manage and produce their own energy and develop appropriate business models, e.g. for off-grid options with various renewable energy technologies?

As a result of the network, Caritas Kasanaensis, the Coffee Kyalugondo Multipurpose Cooperative and ARUWE will cooperate in joint training activities for citizens to build biogas digesters, use biogas briquette press machines and plan a solar system on the storage building of the coffee cooperative in Luweero. The energy activities will be managed by the coffee cooperative which is enlarged with an “energy unit”. The cooperative will then share the concrete results and lessons learned with all network members.

11. Self Assessment

In June 2018, ARUWE and Caritas Kasana Luweero conducted a survey in two districts, Kyankwanzi and Luweero to understand the ‘energy status quo’ in different rural contexts and thus, the energy demand and usage, (financial) resources and willingness to invest money and time into energy technologies and the establishment of an energy community as well as to

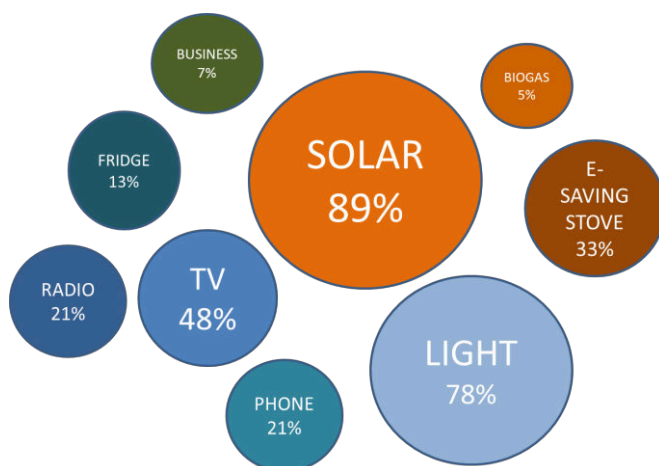
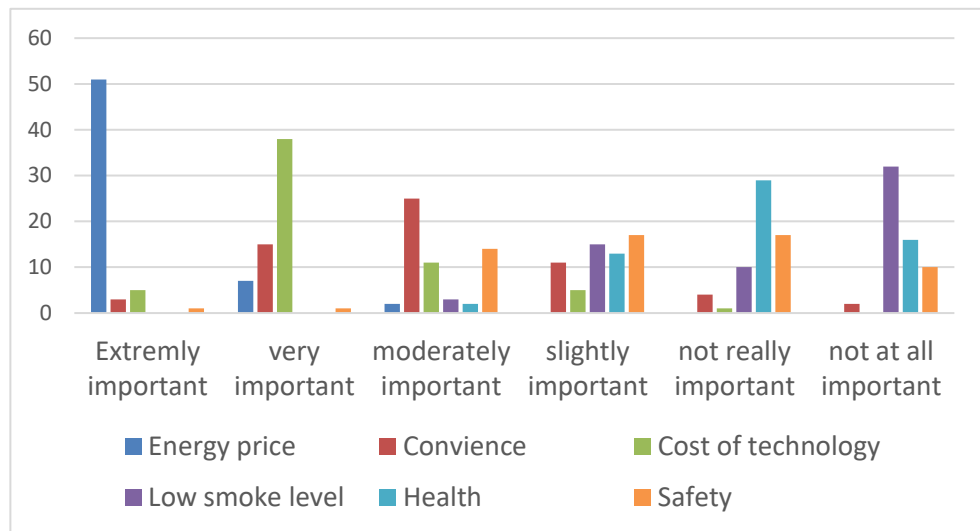
identify and understand existing groups, associations and cooperatives and their cooperative potential.

The main objectives of this survey were:

- To collect initial data on community energy
- To get first-hand information from the communities on their energy needs and to meet the community leaders to understand their plans on climate mitigation and energy access.

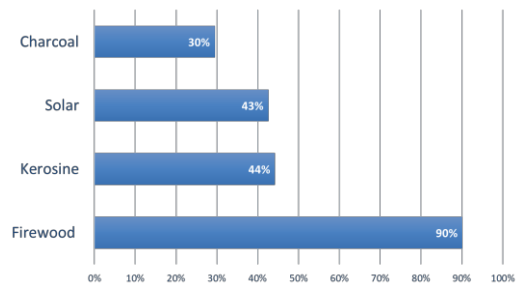
The ARUWE team mobilized communities and organized over 200 meetings with households, political and technical community leaders and faith based leaders. The assessment gives insight to track progress of potential pilot projects in the future. 60 questionnaires were analysed.

Results of the questionnaires show that, when choosing energy technologies, there is high priority on the price and costs for the technologies. Less important are health and safety aspects.



Furthermore, when asking for energy demand a clear priority is given to solar energy (for lighting, TV, phone, fridge, business purposes) and on energy saving stoves and biogas solutions. All the technologies are already existing. Energy communities could foster the dissemination of the technologies via professional and local advising and trainings.

90% of the households filling in the questionnaire use firewood and 30% charcoal for cooking. For lighting 44% still have kerosene and already 43% are able to use some sort of solar device. Most participants would like to engage in an energy cooperative, mainly to increase their access to cheaper and locally produced energy, to use community as social power, to save firewood while using efficient stoves.



Overall, the households see the opportunity to have enough sustainable energy for ALL. Various existing groups like VSLA (village saving and loans associations), women's groups, SACCOs and agricultural cooperatives are interested to improve food production, protect environment, etc. through the integration of an energy component into existing structures.



For instance, communities have been identified in district Luweero (coffee cooperative) and in district Kiboga (local women groups).

(1) Within the coffee cooperative a new sector 'energy' will be added to the existing structures. No new registration is needed which saves time and money, and the following energy technologies have been considered:

- Solar pump for irrigation
- PV plant on depot of cooperative where coffee beans can be stored. Electricity will be used for drying, roasting and milling the coffee. Additionally, mobile phones can be charged.
- Joint biogas plant. Substrate comes from coffee plants and private households. The biogas can be used for cooperative members for cooking. The transport of the biogas could be with [biogas backpacks](#).

(2) For existing women groups in Kiboga, the following technologies have been considered:

- Biomass briquette press machine to use bio-waste from individual households (members can borrow the press and women's group will manage the lending)
- Solar plants for individual households

12. Exchange with representatives of German energy cooperatives

The nearly 1.000 energy cooperatives held an enormous expertise on green citizen energy. The diversity of the structure and the business models is huge. Within the projects we had informal talks and discussions with approx. 15 active persons of cooperatives about potential cooperation between German cooperatives and Ugandan initiatives and energy groups. In principle there is a interest to engage for energy communities in Africa/Uganda.

Main results and formats what they could image or offer

- Max. 2-3 weeks per year for trainings in Uganda on technologies and management of communities / cooperatives
- Organisation of study groups from Uganda coming to Germany with field trips to powerplants and discussions with politicians, energy cooperative members, associations (DGVN, Bündnis Bürgerenergie, etc.)
- Regular mentoring via skype or other online platforms, e.g. monthly skype meetings with current questions
- Providing contact to dealers for decentralized energy solutions
- Supervision of projects online and e.g. annual visits
- Joint development of handbooks, etc.
- Inviting and mentoring of interns from Uganda to Germany to work and live for approx. 4 weeks with energy cooperatives actors or members.

Meeting at coffee cooperative in Luweero:



Chairperson Mrs. Eleanor Kambuğu



Members of the coffee cooperatives

13. Annex:

13.1. [Annex I: Questionnaire - Self-assessment](#)

13.2. [Annex II: ARUWE Narrative Report](#)