



Energy Access Ecosystem Development in Tanzania

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Executive Summary

Tanzania is the largest East African country known for its vast wilderness areas with a total population of around 60million that is widely dispersed with 70% living in rural regions. Agriculture is the most important economic sector, employing more than two- thirds of the country's workforce and supporting the livelihoods of more than three-quarters of Tanzanians. The country has demonstrated a commitment to enhance productivity and accelerate equitable and sustainable growth by boosting its youthful human capital and modernize the efficiency of various critical development sectors, but there still remain pervasive issues that stall a more holistic development process.

The primary goal of the C.S Mott and SELCO Foundation partnership was intended to develop a desired ecosystem or enabling conditions for design and delivery of energy access in Tanzania to meet critical development parameters. There is a mutual recognition to develop local resources, local problem solving tactics suited towards building local solutions. Nimble approaches are required to leapfrog over more traditional centralized models while considering:

1. Similarity in causes of poverty across geographies say in Tanzania and parts of India- inaccessible terrain, political strife, low financial inclusion indices, under-developed supply chains and unskilled youth- can lead to adapting or replicating solutions that have worked in these analogous contexts.

2. Developing maturity of local enabling conditions or ecosystems is a precondition to deploy and design a basket of different decentralized energy models that suits local realities.

3. Multiplication of efforts via local stakeholders and leadership who understand the nuances of local contexts and priorities needs to be integrated into any development.

Programs were designed with partners based on priority impact areas identified in the energy access ecosystem. “Last mile” energy access cannot be tackled from a purely technical aspect, rather, it needs to be nested in a systems based framework that takes into consideration other aspects such as affordable financing, innovations (ownership models and technology adaptation), local energy enterprise development (manufacturers to distributors), human resource development, greater awareness among policymakers that will all catalyse the reach- terrain, end user segments.

As a result of this collaboration the following outcomes have emerged:

- Developing a pipeline of 5 local partners and programs of around USD 1 million collectively to fill parts of the energy access ecosystem and synergizing these programs such that they feed into one another. Furthermore, DOEN Foundation also extended support to the innovation-energy nexus pillar based on existing complementary programs.
- A local partner, Francis Rwegbora - Founder, Fraxen Ltd. was identified to coordinate, regularly convene and facilitate necessary exchanges in support of the program development.
- Hosted 4 stakeholder consultation workshops¹ all towards building pipeline of partners and programs for the energy access ecosystem:

-TAMFI, IMED Foundation, Don Bosco, KAKUTE, SAGCOT.

- Validation of gaps identified in the scoping phase

- Develop a pipeline of implementation partners that can support in incubation, post training linkages for solar technician training, curriculum developers, farm level community organizations etc.

- Hosted 4 learning exchange visits to India² that were carefully curated to mimic analogous contexts and maturity of ecosystems in Tanzania. This, in order to enhance strategic thinking of partners on how to integrate sustainable energy and increased synergies amongst themselves that suited their local contexts:

- Improved strategies to develop “incubation” versus “training” programs for local energy enterprises that go beyond in-classroom sessions but involve on-site mentors, linkages to financial institutions, efficient technical designs, developing good credit terms and high quality components with local suppliers etc.

- First hand understanding of agricultural financial products that promote asset ownership can include powering of solutions via decentralized energy. Seeing examples of how training with rural banks, cooperatives, self help groups can assist to develop pro-poor energy financing models.

- Visits to solar powered livelihood interventions that included different ownership models such as stand alone, farmer level, community level helped to expand understanding around sustainability and productive use that was suited to local

¹ Stakeholder workshop in Moshi (2017) and Dar (2018).

² 11 Energy Champions in Tanzania (Nov 2018), SHG Conference (Oct 2019), IMED Foundation Core Training Team (Nov 2019), Don Bosco Content Consultant (Oct 2019).

conditions vs pre-fixed company models.

- Interaction with skill development experts, demonstration centres, graduated participants, understanding of backward and forward linkages critical to the training programs.

- Formation of Consortium (called as Clean Energy Thematic Work Group (CETWG) initiated by Tanzanian partners (KAKUTE, SAGCOT, TAMFI, IMED, YODEPO and anchored by Fraxen Ltd.) to regularly share and sync their programs for the larger development of the energy access ecosystem in the country.

- Co-developing pipeline of complementary programs

- Enterprise Financing: Understanding interconnections of partners and the backward and forward linkages of the ecosystem through the program designs, revealed the need to conduct landscape research aimed at 100 small to medium solar enterprises and 15 local financing institutions across Tanzania. The output of the report on the solar enterprise financing landscape was to provide insights into the financial support systems for local enterprises and identify modalities that make appropriate financing accessible to these local enterprises.

- Developing benchmarking documents to provide a comprehensive understanding and awareness towards the pricing and quality of technology components in the supply side environment in Tanzania. Pricing fluctuations and varied technical designs impact the affordability of end user financial products. This in turn directly impacts the kind of financing support available to the enterprises as their designs and solutions may be deemed expensive although they are accounting for these fluctuations.

- Demonstration centres as part of skilling and innovation initiatives to generate awareness and interest among different stakeholders by seeing “living labs”.

Pilots of solar livelihood implementations with a local partners

- In order to establish sites to gather learnings from on-ground implementations of solar livelihood interventions, three sewing machines were implemented through SEPON Ltd (local enterprise) in two types of communities. The communities were selected by SEPON Limited considering the potential exposure/ learnings/ evidence the implementation would provide to different ecosystem stakeholders towards unlocking some of the financial and delivery models of technological innovation.



Sewing machine entrepreneurs during the inauguration of solar powered sewing machines at Chanika, July 2019

- A partnership with ELICO is underway to test and demonstrate livelihood solutions with rural microentrepreneurs in order to understand suitability of technology, potential financial and ownership models. SELCO would provide technical support, training and capacity building support while ELICO brings in their expertise of technology implementation, development of financial and delivery models for the solutions. The interventions chosen by ELICO for the pilots include - Dairy (milking machine), Pottery Wheel, Water Pumps, Rice Mill (hulling, grading, polishing) and Sewing machines.
- In early 2019, The Efficiency for Access Research and Development (R&D) Fund launched its second call aimed at applicants developing technologies and products for sustainable cooling in off- and weak grid areas. This included fans, refrigeration and cold chain. One of the winners, Devidayal (an enterprise that deploys solar refrigerators) was keen to explore pilots beyond India. SELCO facilitated discussions between local NGO partner ELICO in Tanzania to implement need-based solar refrigerator solutions for small businesses in Tanzania. The objective is to test and demonstrate various typologies of business models including appropriate financing and ownership models to support local businesses via these retail cold storage solutions.
- With the support of DOEN Foundation, the program has been initiated on sustainable energy + grassroots livelihood innovation development by the local organization KAKUTE. The program focuses on leveraging and developing capacities of local technology, finance ecosystems and local end users who promote Innovative solutions to transform lives in rural Tanzania via Decentralized Sustainable Energy access. The implementation program cuts across farm and non-farm interventions in the regions of Dodoma, Iringa and Morogoro.

Over the last few years, some learnings have also emerged and are captured below. This can also serve as inputs to further program designs in the country:



Delegates in discussion in the premises of one of the champion end-user's house

FINANCING

- Need for financial products with longer tenures (5-10 years), lower annual interest (<12%) that can support the **ownership of assets**³ that can be powered by DRE.
- Even a well designed financial product can ultimately fail unless there is a parallel or preceding **grant or flexible funding support for building complementary organizations.**
- **Awareness creation is one part of the value chain of financial inclusion**
- In the initial stage of program design, a **parallel pool of de-risking funds** could have been tried to spur the thinking of long-term based asset based financing with the local financial institutions.
- Need to develop landscape studies of local suppliers of energy technology along with insights from MFIs themselves on **why or how some of their earlier energy financing programs had worked/ failed.**
- Understanding terms of financial support and resultant stability associated with the **cost of funding to the central bank.**

“ Even a well designed financial product can ultimately fail unless there is a parallel or preceding grant or flexible funding support for building complementary organizations. ”

³ Defined as tangible or intangible that is capable of being owned or controlled to produce value and in turn positive economic value. This includes 5 capitals: natural (land), physical (agricultural), financial (cash or savings), human (knowledge, skills), and social (ownership, social networks).

INCUBATION

- There are several initiatives around ICT based tech incubators but **limited availability of incubation centres with more customized, on ground mentorship and hand holding support.**
- **Incubation efforts that can nurture and support cooperatives and community based organizations whose proximity to the end-users in many parts of rural Tanzania are essential to build trust and mobilize interest in solutions.**
- One of the recurring topics while discussing the needs of enterprises to deliver long-term sustainable solutions is the lack of access to quality hardware and appropriate technology. Need for **resource mapping to develop benchmarking for quality and pricing.**
- Less attention is paid to developing **diverse pipeline channels to attract potential aspiring or existing local energy enterprises** that are typically not on the radar.
- **Mapping local expert mentors** across the types of enterprises (resource persons) training processes and in geographies where face to face interactions are possible.

SKILLING

- Lack of **advanced technical and futuristic training** that would help the young trainees to be equipped with relevant skills in coming years.
- The skilling centres cannot be developed in isolation and needs to have close **interlinkages between financial and enterprise ecosystems.**
- **On-site practical learning demonstration** to teach technology, finance and applications of DRE innovations in and around the skilling centres.
- **Innovation and seed capital** for potential exits needs to be inculcated within

the skills program.

- There is an opportunity to **incorporate DRE into sectoral training centres** such as agriculture training centres, health-specific training centres that would not only cater to the students but also to the people involved in these specific sectors (farmers, healthcare professionals, etc).
- Mapping out **existing trades within Don Bosco** and plugging into those programs incorporating sustainable energy thought processes in them.

INNOVATIONS

- In order to establish a strong local innovation ecosystem in Tanzania it isn't required to import the entire technology, **rather critical parts could be brought in and it could be assembled locally.**
- Necessary to build a **combination of delivery models to make the innovations suited to a variety of end-user contexts** ex. Via NGOs or government agencies or large multilateral initiatives.
- The **investment in high-risk innovation** is considerably low as one of the reasons being the absence of other ecosystems resulting in those investments not leading to significant returns.
- The **modality of building partnerships** - Strategic/ sectoral partnerships for innovation – has been emerging in the form of developing MoUs, identifying nodal points in value chains and considering financial and delivery models while developing these processes.
- **Understanding and leveraging the existing core govt/other stakeholder grant programs** focused on innovation (failure capital, mentorship capital needs to be built in), and adapting energy innovation programs to these programs.

Based on the foundational learnings from India and Tanzania, SELCO Foundation seeks to further develop programs that demonstrate the criticality of bringing

different players together and cementing the integration of a holistic thought process into SDG 7 into various sectors & outcomes. Using this ground work and partnership with C.S Mott Foundation, SELCO is seeking to conceptualize and implement an international knowledge and implementation platform to position UN's SDG 7 as a critical catalyst for a sustainable and equitable future in the Global South and catalyze South-South learning platforms.

It is intended that this ongoing program provides an impetus to synergize ground efforts with national and international efforts where similar ecosystem programs are being explored with local partners. Also potentially opening up funding opportunities to expand thinking on this concept and loop in local partners to initiate programs on the ground mirroring the program in Tanzania.



Solar light for livelihood, in the village of Kibindu in Tanzania - the bike mechanic shop uses the solar light to continue their service after the sunset - the solution is implemented by one of the local solar enterprises in Tanzania - May 2019

Tanzania

Landscape and Shift in the Developmental Perspective

Tanzania is often regarded as one of the most stable countries in Sub-Saharan Africa. It is the largest East African country known for its vast wilderness areas with a total population of around 60million. Country's population is widely dispersed with 70% living in rural regions. Agriculture is the most important economic sector, employing more than two-thirds of the country's workforce and supporting the livelihoods of more than three-quarters of Tanzanians. It is followed by services (information and communication), mining and manufacturing.

Though there has been remarkable progress in reductions in the poverty rate, the absolute number of poor citizens has stagnated (14 million people) because of the high population growth rate. The government has taken steps to make poverty alleviation a central mandate and has shown an increased level of commitment to broader poverty reduction, greater social protection and the human development agenda⁴. Although 29 percent of Tanzania's households have access to electricity, access is available to just 10 percent of rural and 7 percent of poor households⁵.

⁴MKUKUTA II: national strategy for growth and reduction of poverty;BRN: Big Results Now initiative; The Productive Social Safety Nets (PSSN) program managed by Tanzania Social Action Fund (TASAF)

⁵World Bank 2019

While Tanzania has demonstrated a commitment to enhance productivity and accelerate equitable and sustainable growth there still remain pervasive issues that stall a more holistic development process:

- More than 30 percent of Tanzanian lead micro- and small firms cite uncertain economic environment, inadequate technology, lack of policy support to SMEs, insufficient demand and production capacity, inadequate physical infrastructure, currency fluctuations, unfair competition, and lack of raw materials and qualified labor as main constraints. Furthermore, it's widely recognized that patient capital is largely out of the purview of local African enterprises. Many follow mainstream investment logic-venture capital models- an approach that is ill suited to social issues that require a more long-term horizon to solve. Local enterprise financing continues to be evasive from international investors and hard to access from domestic sources.
- Tanzania has had a rich history with alternative community based ownership models particularly those rooted in cooperatives. In part this sort of agrarian socialism substituted the absence of an industrial economy and was instrumental in how wealth was distributed in a manner that benefited the community. Current industrial agriculture approaches, if not structured more inclusively, can possibly provide more power in the hands of larger corporations thereby leaving the bulk of Tanzania's small holder farmers marginalized due to absence of tools to participate as owners vs contract laborers in a more modernized agriculture economy.
- Tanzania consists of a wide range of stakeholders to provide technology components related to solar systems and other decentralized livelihood solutions. Largely dependent on long supply chains in an import driven market. However, the initial assessment of pricing and quality of the local solar enterprises show that there are gaps existing in terms of procuring those components as the costing of system designs are often on the higher side. This

is due to the lack of cohesive database (capacities, types, power ratings, etc) in the components thus enterprises ending up in going for what is available in the market.

- Many Tanzanians lack formal financial relationships such as owning a bank account, having formal savings, and being able to access credit from a financial institution. Despite the presence of local financial infrastructure- commercial banks, cooperatives, MFIs, community banks- there is limited disbursement of credit and accessibility is often cumbersome with unfavourable terms (high interest rates, short durations) making it unattractive for the poor. An absence of intermediaries as well makes it hard to reach the last mile. Thus, domestic credit for end users is inaccessible.
- It is estimated that less than 30 percent of the workers in industry are skilled. Many cite shortage of qualified labor as their main problem. This suggests that as firms grow, they engage in more sophisticated production that requires higher-skilled workers, who are rare in the local market. Skilling its youth to open up self-employment remains to be fully explored and training methods need to embrace more modern techniques. Further beyond training, placements and exit strategies remains challenging, forcing many to continue as employees.

As Tanzania looks forward in boosting its local economy and eradicating poverty, sustainable energy plays a critical role and efforts need to be made to improve accessibility, availability and sustainability of energy services for the poor. Following scoping activities laid out in 2015, these findings reiterate the importance of developing an enabling environment in Tanzania to reach long-term development using sustainable energy as a catalyst for the country.

A Brief Overview

Energy Access Ecosystem Building Approach & Development

Partnership Alignment

The primary goal of the partnership was to develop a desired ecosystem or enabling conditions for design and delivery of energy access in Tanzania to meet critical development parameters. There is a mutual recognition to develop local resources, local problem solving tactics suited towards building local solutions. Tanzania's historic roots of power to the people, alternative economic models, distributed community wealth⁶ offers opportunities to demonstrate development models that when catalyzed by decentralized sustainable energy can provide resilient socio-economic pathways for Tanzanians.

Nimble approaches are required to leapfrog over more traditional centralized models and new pathways need to be built recognizing:

- 1. Similarity in causes of poverty such as across geographies-** inaccessible terrain, political strife, low financial inclusion indices, under-developed supply chains and unskilled youth- can also find solutions that have worked in analogous contexts.

⁶ <https://thenextsystem.org/learn/stories/building-community-wealth-globally-kigoma-preston-collaboration#part-i-a-history-of-community-wealth-building-in-tanzania>

2. Developing maturity of local enabling conditions or ecosystems is a precondition to deploy and design a basket of different decentralized energy models that suits local realities

Stark Energy Access Needs

70% of population in Tanzania resides in rural areas. 32.8% of population has access to electricity. Of which 16.9% have access to electricity. Low density and sparse distribution challenges grid extensions

Analogous Contexts

India's diverse contexts can be used to draw parallels in similar cross-country contexts. From terrain, population densities, maturity of financing, local entrepreneurial capacities etc.

Systems Approach

Multiple factors play a role in the sustainable delivery of energy solutions. Combination of 5 pillars contributes to holistic solutions- innovation, policy, skills, finance and incubation of local enterprises & civil society

It is in this context that SELCO Foundation and C.S Mott Foundation have collaborated since 2015 to demonstrate examples and models that inculcate this

3. Multiplication of efforts via local stakeholders and leadership who understand the nuances of local contexts and priorities needs to be integrated into any development

Government Buy In

Active government policies to ensure socio-economic growth and energy access via key policies like MKUKUTA, LTPP, BRN, Vision 2025 and National Electrification plans

SDG 7 across all SDGs

Energy Access by itself is not impactful, rather it role cuts across every other SDG. It enhances the delivery of other critical outcomes such as education, productive use, health, jobs, water etc.

Local Capacities

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thought process to “prove” the sustainability and relevance within Tanzanian contexts that can have broader replicability for the region and the world.

Progress and Implications

Phase 1 2015-2017

Scoping & Partner Identification

SELCO conducted desk research and in-person consultations to map the energy access ecosystem

Scenario report for Tanzania developed

Validation of gaps identified, priority areas, ecosystems approach via two stakeholder workshops in Moshi and Dar es Salaam

Identification of four local stakeholders, co-develop program designs and co-develop proposals as pipelines to go into implementation in phase 2 in each ecosystem pillar

Phase 2 2017-2019

Implementation

Commenced programs with local partners for youth targeted solar technician training + innovators (2017); incubation of local energy entrepreneurs (2019); awareness generation on energy end user and enterprise financing (2019); last mile innovations via sustainable energy for the poor.

SELCO advisory support extended to commenced programs with local partners in the form of Tanzania team visits to India, coordinated expert interactions, sharing of templates/formats, site visits to installations/centres/field experts/subject matter experts, co-developing curriculum, sharing capacity building failures/lessons

Continued scouting of pipeline of partners and programs that are complementary to building the ecosystem ex. developing an enterprise financing fund, developing an end user de-risking fund with financial institutions, skilling energy demonstration centres across sectors (agriculture, livelihoods)

Learning Exchange Visit for 11 champions from Tanzania re: Ecosystems Approach

Participation at a conference in India for 10 partners related to adapting lessons from community based financing via self help groups and evolution of financial inclusion architecture in India

Phase 3 2019-2022

Macro Country and Global Ecosystem

African Country Assessments

Continuous intensive advisory support to local partners in skills, innovation, incubation and financial inclusion.

Seeding pipeline of programs in Sierra Leone, Ethiopia, Nepal, Philippines parallel to Tanzanian partnerships

International stakeholder push for TZ/Africa ecosystems work re: ISA, IRENA, SE4All + cross country exchange programs

Broader connections based on 2 phases

- **Other country interests:** Malawi, Sierra Leone, Burkina Faso, Ethiopia
- **Global Emerging Partnerships:** International Solar Alliance, IRENA, SE4ALL, WHO, UNHCR, UNITAR
- **Conceptualization of Global Ecosystems Hub:** Concept discussion convening at Climate Week-New York, initiating partnerships in Sierra Leone/Ethiopia/Burkina Faso

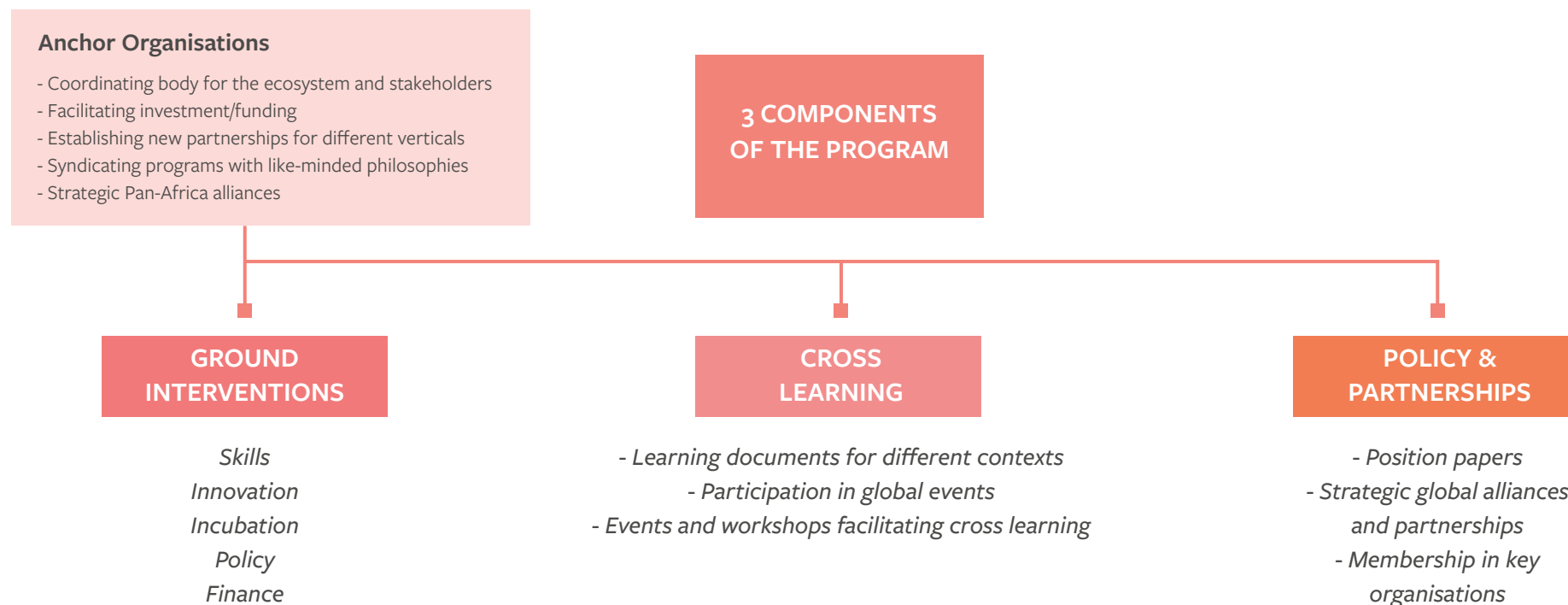
Programs were designed with partners based on priority impact areas identified in the energy access ecosystem. Partners were identified based on a series of one to one meetings and stakeholder convening workshop in XXyear. In particular,

partners were recognized leaders in their field, experience in building parts of the ecosystem, potential to influence broader conversations based on running the programs among others.

GLOBAL REPLICATION PROGRAM AT SELCO FOUNDATION - AN OVERVIEW

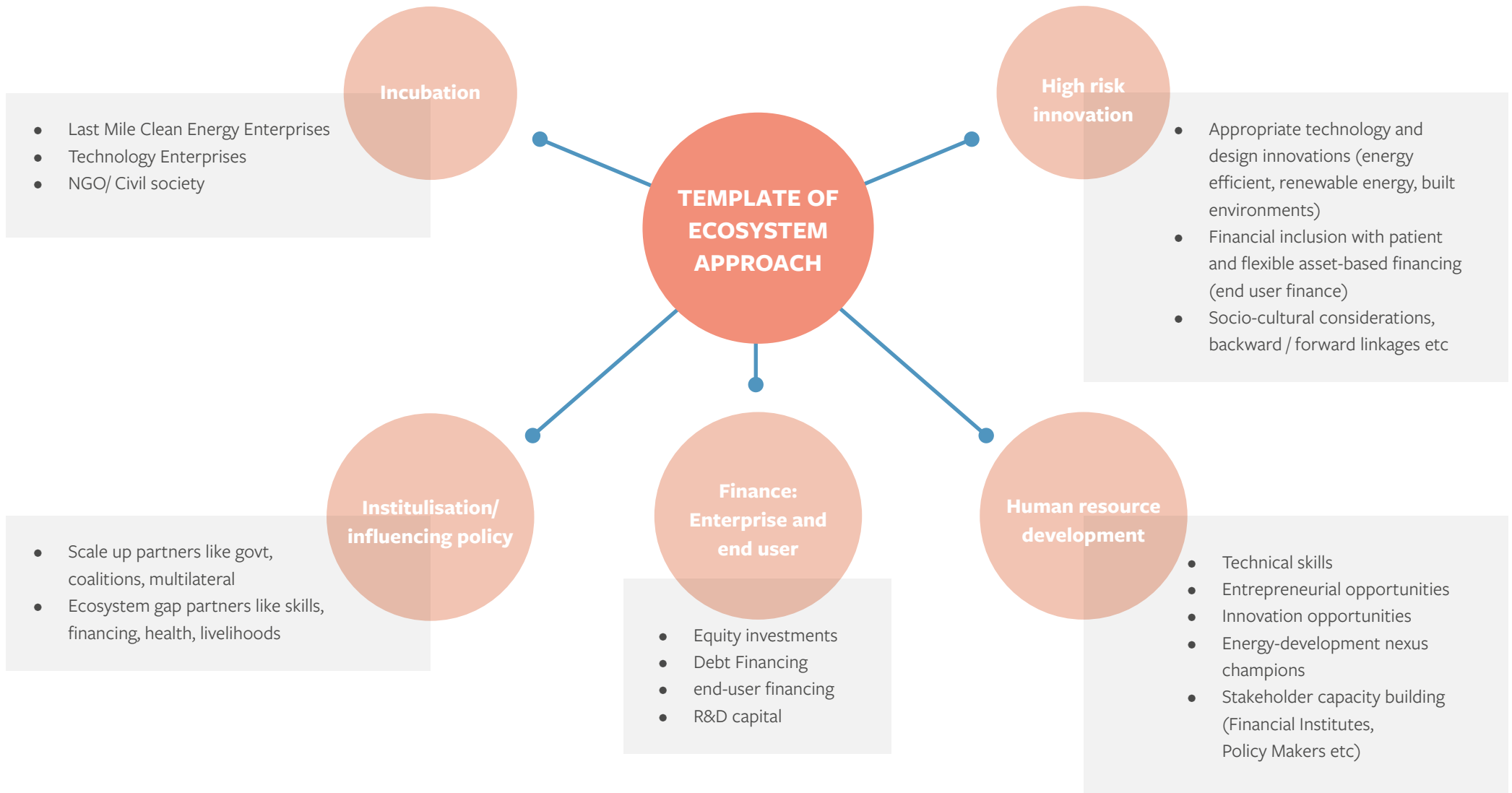
Scaling and Replicating

The enabling conditions for sustainable energy interventions, from the learnings of ecosystem framework from Indian context to other countries and vice versa



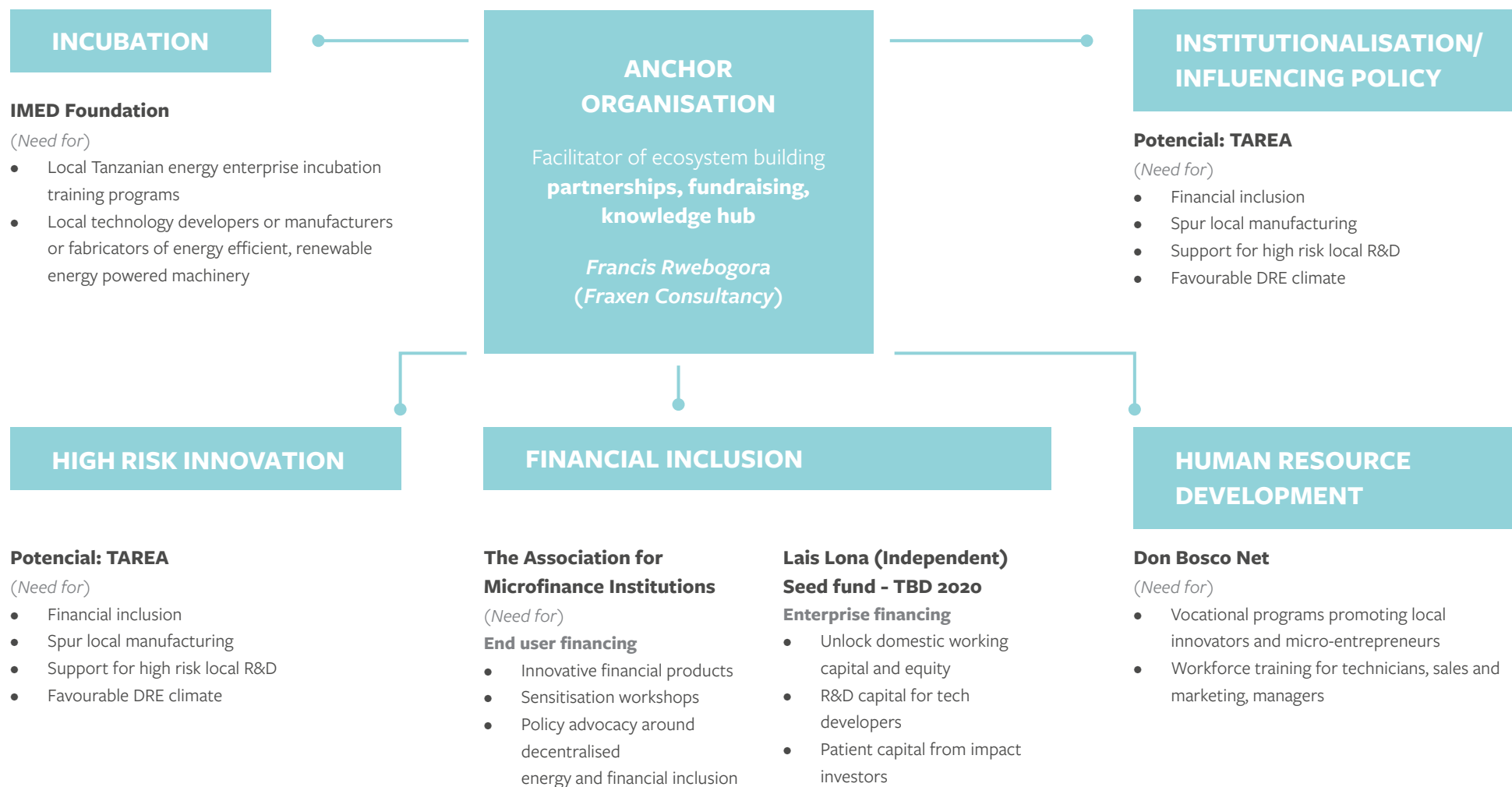
“Last mile” energy access cannot be tackled from a purely technical aspect, rather, it needs to be nested in a systems based framework that takes into consideration other aspects such as affordable financing, innovations (ownership

models and technology adaptation), local energy enterprise development (manufacturers to distributors), human resource development, greater awareness among policymakers that will all catalyse the reach- terrain, end user segments.



The program has been developed towards achieving different aspects of Sustainable Development Goals for Tanzania by using sustainable energy as a catalyst. The long-term objectives of each part of the ecosystem being developed are described below including a description of each partner. Efforts are being

made to synergize programs such that they each feed into one another creating a conducive environment to design and deploy sustainable energy solutions to improve lives of under-served populations.



- **Human Capital Development:** To increase quality of skilled manpower for delivering necessary energy services to the poor.

- In developing solar technician capacities, local energy enterprises and NGOs are able to cater to the demand in installations and maintenance thereby increasing confidence in DRE.

- Inspiring and nurturing young innovators who can be local problem solvers and therefore reimagine locally driven solutions to pervasive social issues is in line with the Tanzanian government's mandate to drive more youth lead job creators vs job seekers to industrialize the economy.

- **Indigenous Innovations:** To design, develop and deploy technology innovations that can reduce drudgery, increase productivity and create safety nets for the poor.

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- Focus on local innovations particularly around agriculture to become assets for the poor (ex. small holder farmers) via complementary appropriate financial and ownership models.

- **Financial Inclusion:** To improve capacity and ability of local microfinance institutions in understanding and becoming familiar with the clean energy



The delegates from Tanzania visit a pottery entrepreneur during their learning exchange visit to India. The entrepreneur uses a solar-powered pottery wheel for improved productivity and reduced drudgery.

technologies and access to financing for enterprises and end users in decentralized renewables in Tanzania.

- Enhanced affordability to save, borrow and invest in energy solutions by the poor and thus move beyond cash based systems that prevents them from accessing high tiers of energy solutions like agri-processing machinery, home lighting systems etc.
- Improved financial infrastructure among local MFIs to increase risk appetite, access to credit for end users and local energy enterprises.

- **Empowering Local Energy Entrepreneurs and Local Supply Chains:** To identify and nurture the capacities of local Tanzanian energy enterprises to deliver last mile energy solutions that improve quality of life and other development outcomes (health, education, livelihoods) for underserved communities of Tanzania.

- Create a level playing field for several passionate young Tanzanian entrepreneurs

to be capable of starting and running an energy enterprise and thus be competitive and responsive to the energy demands and needs of end users.

- Improve local supply chains of components and delivery of services to the last mile in a manner that responds to local needs and can provide long term services.

As a result of this collaboration the following outcomes have emerged:

- **Identification of Interested Ecosystem Stakeholders:** Hosted 4 stakeholder consultation workshops⁷ all towards building pipeline of partners and programs for the energy access ecosystem which lead to:

- Identifying partnerships with TAMFI, IMED Foundation, Don Bosco, KAKUTE, SAGCOT. See the annexure 1 for a brief on the partners.

- Pipeline of partners like YODEPO, a grassroots NGO with interests in anchoring and stabilizing FPO/ FPC formations in the region of Iringa; TCRS an organization whose work is concentrated in refugee relief and resettlement to southlands of refugees who fled from the man conflict-ridden great lakes, ELICO an organization focused on livelihoods and energy.

- **Local Coordination Partner Identified:** A local partner, Francis Rwegbora - Founder, Fraxen Ltd. was identified to coordinate, regularly convene and facilitate necessary exchanges in support of the program development.

- **New Programs towards Energy Access Ecosystem Development:** Developing a pipeline of 5 local partners and programs of around USD 1million collectively to fill a part of the energy access ecosystem and synergizing these programs such that they feed into one another. These programs include skill development, incubation of local enterprises, awareness generation of local financing institutions, local innovations and seeding of a local anchor partner. Furthermore, DOEN Foundation also extended support to the innovation-energy nexus pillar of USD 200,000 as part of plugging into the energy access ecosystem. The following outputs were also delivered in consultation with partners to co-develop the above stated pipeline of complementary programs:

- Enterprise Financing: Understanding interconnections of partners and the backward and forward linkages of the ecosystem through the program designs, revealed



⁷Stakeholder workshop in Moshi (2017) and Dar (2018).

the need to conduct landscape research aimed at 100 small to medium solar enterprises and 15 local financing institutions across Tanzania. The output of the report on the solar enterprise financing landscape was to provide insights into the financial support systems for local enterprises and identify modalities that make appropriate financing accessible to these local enterprises.

- Developing benchmarking documents to provide a comprehensive understanding and awareness towards the pricing and quality of technology components in the supply side environment in Tanzania. Pricing fluctuations and varied technical designs impact the affordability of end user financial products. This in turn directly impacts the kind of financing support available to the enterprises as their designs and solutions may be deemed expensive although they are accounting for these fluctuations.

● **Hands-on Knowledge Exchange Workshops and Exposure Visits:**
Hosted 4 learning exchange visits to India⁸ that were carefully curated to mimic analogous contexts and maturity of ecosystems in Tanzania. This, in order to enhance strategic thinking of partners on how to integrate sustainable energy and increased synergies amongst themselves that suited their local contexts:

- Improved strategies to develop “incubation” vs “training” programs for local energy enterprises that go beyond in-classroom sessions but involve on-site mentors, linkages to financial institutions, efficient technical designs, developing good credit terms and high quality components with local suppliers etc.

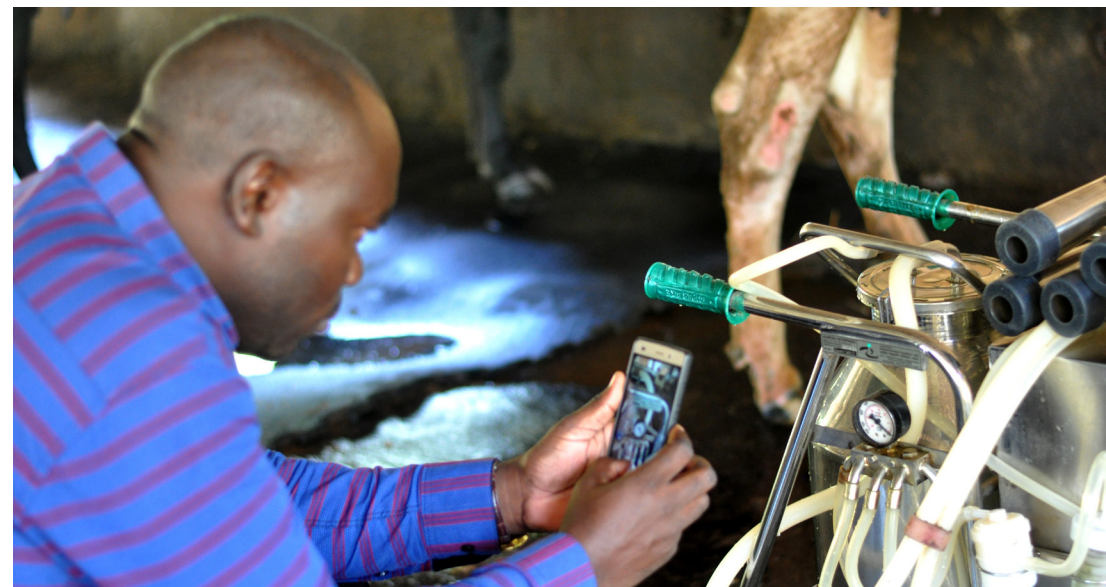
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Visits to solar powered livelihood interventions that included different ownership models such as stand alone, farmer level, community level helped to expand understanding around sustainability and productive use that was suited to local conditions vs pre-fixed company models.

- Interaction with skill development experts, demonstration centres, graduated participants, understanding of backward and forward linkages critical to the training programs.

- Formation of Consortium (called as Clean Energy Thematic Work Group (CETWG) initiated by Tanzanian partners (KAKUTE, SAGCOT, TAMFI, IMED,



Mr. Benard Okech, a local energy entrepreneur from Tanzania, at the solar-powered milking machine site in Karnataka, India, during the visit in Nov 2018.

⁸11 Energy Champions in Tanzania (Nov 2018), SHG Conference (Oct 2019), IMED Foundation Core Training Team (Nov 2019), Don Bosco Content Consultant (Oct 2019).

YODEPO and anchored by Fraxen Ltd.) to regularly share and sync their programs for the larger development of the energy access ecosystem in the country.

- **Pilots of Solar Livelihood Implementations:**

Identify implementation sites to gather learnings and test the ecosystem approach of the intersection of technology, finance and social aspects from solar livelihood interventions. In that regard:

- Three sewing machines were implemented through SEPON Ltd (local enterprise) in two types of communities. The communities were selected by SEPON Limited considering the potential exposure/ learnings/ evidence the implementation would provide to different ecosystem stakeholders towards unlocking some of the financial and delivery models of technological innovation. These demonstrations also serve as “living labs” to generate awareness and interest among different stakeholders by seeing the technologies working on the ground
- A partnership with ELICO is underway to test and demonstrate livelihood solutions with rural microentrepreneurs in order to understand suitability of technology, potential financial and ownership models. SELCO would provide technical support, training and capacity building support while ELICO brings in their expertise of technology implementation, development of financial and delivery models for the solutions. The interventions chosen by ELICO for the pilots include - Dairy (milking machine), Pottery Wheel, Water Pumps, Rice Mill (hulling, grading, polishing) and Sewing machines.
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- With the support of DOEN Foundation, the program has been initiated on sustainable energy + grassroot livelihood innovation development by the local organization KAKUTE. The program focuses on leveraging and developing capacities of local technology, finance ecosystems and local end users who promote Innovative solutions to transform lives in rural Tanzania via Decentralized Sustainable Energy access. The implementation program cuts across farm and non-farm interventions in the regions of Dodoma, Iringa and Morogoro.
- For effective demonstration of technologies, financial and delivery models of community led sustainable energy - livelihood innovations, a long term strategy that involves close collaboration of local stakeholders, contextualized technological solutions and an effective financial support in the right combination of grant supports and financial instruments is necessary. With these initial programs the foundation is being built towards bringing long-term sustainability of livelihood innovations in the country. Through these, it is hoped that many meaningful decentralized energy driven community development models are developed in Tanzania

Key Learnings

Incubation
Financing
Innovation
Skilling



Discussion at Don Bosco, Dodoma, between SELCO, and the team from Don Bosco on content and curriculum development during the visit in May 2019



The core training team from IMED Foundation visited relevant end-user sites with different delivery models of energy solutions during their program development support visit to SELCO sites in India, Nov 2019

Skilling

- There is a need to build **advanced technical and futuristic training** that would help the young trainees to be updated with advancements in technologies in coming years. There are opportunities to establish strong linkages between local industries and vocational institutes by bringing in industrial relevance to training methodologies, experience-based training programs, integrate technology like virtual reality or ed-tech and so on.
- The skilling centres cannot be developed in isolation – one of the critical learnings is that the current programs in the country are just focused towards training youth without having an existing ownership or close **interlinkages between financial and enterprise ecosystems**.
- Although the students are taught through a comprehensive content and curriculum, the lack of practical exposure to the interventions make it difficult for the students to understand the innovation and entrepreneurial aspects around the solutions. Thus, **on-site practical learning demonstration** to teach technology, finance and applications of DRE innovations in and around the skilling centres.
- As some of the graduates coming out of the program do possess the aptitude for innovation and entrepreneurship, the **innovation and seed capital** for potential exits needs to be inculcated within the skills program. This is critical because most of the young people who are part of the Don Bosco program come from adverse environments thus it will be hard to support themselves without opting for jobs.
- There is an opportunity to **incorporate decentralized energy into sectoral training** centres within the skill development training/ teaching approaches. This opens up opportunities beyond local energy enterprises and includes agriculture training centres, health-specific training centres that would not only cater to the students but also to the people involved in these specific sectors (farmers, healthcare professionals, etc). Thereby developing skilling catering to the confluence of communities, NGOs innovators and enterprises.



Mr. Magessa, the consultant from Don Bosco in discussion with SELCO team at SKDRDP Livelihood center during his visit to SELCO to support Entrepreneur Development Program for Don Bosco, Oct 2019

- Overall Tanzanian Landscape
- Specific Partnership Learnings

Innovation

- In order to establish a strong local innovation ecosystem in Tanzania, the initial steps could come from leveraging opportunities by “adapting” innovation via south-south cooperation, both within Africa (Ethiopia, Kenya, Nigeria have local manufacturing capacities) and other geographies. It isn’t required to import the entire technology, **rather critical parts could be brought in and it could be assembled locally**. Also, in case of importing, since it might be absolutely necessary to import certain components, the efforts need to go into building effective import channels as well to support local innovation.
- Considering the varied climates, geographies and industrial zones in Tanzania, when innovations are built keeping end-users at the centre, it is necessary to build a **combination of delivery models to make the innovations suited to a variety of end-user contexts**. Not all innovations could go via enterprise models, there can be alternatives (non-market ones) that involve NGOs or government agencies or large multilateral initiatives.
- The **investment in high-risk innovation** is considerably low as one of the reasons being the absence of other ecosystems resulting in those investments not leading to significant returns. On the other hand, this results in lack of incentives for local innovators to take the risk to pursue their path and passion of innovation. Thus, the way of breaking this vicious cycle could be in the form of providing evidence of successful local innovation simultaneously building the ecosystem through pilots.
- The **process of need identification** via local government agencies, NGOs, students, village councils, local energy enterprises and so on is crucial to gathering diverse problems. These diverse identification channels are crucial to also developing partnerships and designing effective implementation methodologies.
- The **modality of building partnerships** - Strategic/ sectoral partnerships for innovation – has been initiated emerging in the form of developing MoUs, identifying nodal points in value chains and considering financial and delivery models while developing these processes.
- **Understanding and leveraging the existing core gov/other stakeholder grant programs** focused on innovation (failure capital, mentorship capital needs to be built in), and adapting energy innovation programs to these programs.



Mr. Sudhir Kulkarni, from SELCO Foundation, explains the demonstrations of solar powered livelihood equipment at SELCO’s Manipal office, Nov 2018

- Overall Tanzanian Landscape
- Specific Partnership Learnings

Incubation

- There are several initiatives around ICT based tech incubators but **limited availability of incubation centres with more customized, on ground mentorship and hand holding support** for last mile energy system integrators, clean technology enterprises (manufacturing); retail distributors, component suppliers. Existing incubators are more of training/ capacity building institutes and in-class cohort based training centers.
 - Another type of incubation support, beyond enterprises or financial institutions, that is missing are **those incubation efforts that can nurture and support cooperatives and community based organizations whose proximity to the end-users in many parts of rural Tanzania are essential to build trust and mobilize interest in solutions.** These are important stakeholders in the decentralized energy value chain.
- One of the recurring topics while discussing the needs of enterprises to deliver long-term sustainable solutions is the lack of access to quality hard-ware and appropriate technology. Hence there is a **requirement for significant grant support (or can only work with long term finance) to build a local manufacturing or supply chain ecosystem with appropriate benchmarks.**
 - Less attention is paid to developing **diverse pipeline channels to attract potential aspiring or existing local energy enterprises** that are typically not on the radar ex. Awareness workshops in partnership with grassroots organizations, referrals from other incubators or training programs or alumni on energy, radio, social media, investment or financial institutions that have a pipeline of aspiring fund seekers and so on.
 - Incorporation of **additional content modules** that are critical to establish reliability and credibility such as need for efficient technical design, identifying and building grassroots partners, awareness around appropriate financial products and so on. In the current IMED program, these modules have been mapped and incorporated.
 - **Mapping local expert mentors** across the types of enterprises (resource persons) training processes and in geographies where face to face interactions are possible. IMED Foundation has currently mapped out mentors/ local experts to support the enterprises.
 - Need for **resource mapping to develop benchmarking for quality and pricing.** An initial assessment of pricing designs by local solar enterprises show that there are limitations in procuring these components as the costing of system designs are often on the higher side. This is due to the lack of right choices (capacities, types, power ratings, etc) in the components thus enterprises ending up in going for what is available in the market.
- Overall Tanzanian Landscape ■ Specific Partnership Learnings

Financing

- Need for financial products with longer tenures (5-10 years), lower annual interest (<12%) that can support the **ownership of assets**⁹ that can be powered by DRE thus, empowering the poor to have more access to tools that can effectively help rise above poverty. There exists **agriculture financing** which can be tapped into to develop or integrate DRE as part of those livelihood portfolios.
- Even a well designed financial product can ultimately fail unless there is a parallel or preceding **grant or flexible funding support for building complementary organizations** like grassroot NGOs, training institutions, community-interest financial institutions, creation of farmer producer organizations and others who can develop market linkages, financing, training that are critical to local communities ultimately accessing a solution that is sustainable in a financial, social and technical manner.
- **Awareness creation is one part of the value chain of financial inclusion.** Other parts need to be also considered as part of the overall program design i.e. developing intermediary NGOs whose proximity to end users make savings or collections easier, developing all types of financial institutions (cooperatives, self help groups, farmer organizations, NGO-MFIs etc), DRE awareness among end users, de-risking funds to spur financial appetite, incubating supply chains and finally appropriate policies.
- A popular model in Africa has been Pay-G however they are not financing models rather a tool to facilitate financing by reducing transaction costs for collection of payments. The expensive **debt financing required for a PAYG business model incentivizes short term financing (<2 years) hence leading to consumptive products.** As is emerging currently, PAYG companies are better placed to partner with financial institutions and offer it as a tool to lower the risk appetite associated with collections especially to reach areas far away from the main branches.
- In the initial stage of program design, a **parallel pool of de-risking funds** would be critical to spur the thinking of long-term based asset based financing with the local financial institutions. This would help in testing “pilots” with champions that emerge through the capacity building programs.
- Need to develop landscape studies of local suppliers of energy technology along with insights from MFIs themselves on **why or how some of their earlier energy financing programs had worked/ failed**, also financing products from other sectors like agriculture could strengthen the program. This would help in developing financial products that correct for these earlier mistakes.
- Understanding terms of financial support and resultant stability associated with the **cost of funding to the central bank** helps in comprehending domestic cost of financing and how financial products can be shaped at a policy level. Particularly in order to construct better financial products with longer term finance and better interest rates.
- Need for **consultations with Indian and other global grassroot organizations associated with local financing** like Harsha Trust, SKDRDP, Hamsa Chaitanya Cooperative Society, BRAC (Bangladesh), Peace and Equity Foundation (Philippines) to understand the modalities of their financing flow, support from soft monies and their efficient internal management to build that foundation for effective financing structures.

⁹Defined as tangible or intangible that is capable of being owned or controlled to produce value and in turn positive economic value. This includes 5 capitals: natural (land), physical (agricultural), financial (cash or savings), human (knowledge, skills), and social (ownership, social networks).

Conclusion

The Way Forward

As the world faces crisis over pandemics, water, climate change, energy and biodiversity, we need to tap into a variety and creativity of thinking and actions on sustainability in societies across the globe. There is a changing mindset to move away from a simplistic old dual categorization of “developed” and “developing” countries toward a new multipolar world. Where developing or the global south is associated with those corners of the world with hand-me-down ideas of other places and other people. Solutions that work in one place might fail in another if they do not consider local communities, ecosystems and socio-economic conditions. Unfortunately, financial poverty is often confused with intellectual poverty. There is much to be learned from efforts to create a level playing field for the poor from the Tanzanian context of agricultural cooperative movements, nation building and penetration of local savings groups that can be relevant to analogous contexts in other countries within and outside the African continent.

The program seeks to identify local champions within these partnerships, demonstrate the interlinkages of different parts of the program and help mature parts of the ecosystem in order to effectively show the importance of an end to end approach in designing and delivering SDG 7 solutions. SELCO has a 5-8 year vision for Tanzania and is committed to crowding in suitable partners to co-develop these programs.

Based on the foundational learnings from India and Tanzania, SELCO Foundation seeks to conceptualize and implement an international knowledge and implementation platform to position UN’s SDG 7 as a critical catalyst for a sustainable and equitable future in the Global South and catalyze South-South learning platforms.

The main objectives include:

- Become a learning exchange platform that will create connections, facilitate productive transfers of local knowledge, local expertise, networks in order to catalyze implementation of pro-poor sustainable energy solutions.
- Transform efficiency and effectiveness of impact by adopting an ecosystems approach for replication and contextualization leading to localized implementation and ownership.
- Drive for sustainable energy and development agendas that are shaped and implemented among locally led voices in communities and regions of distinct climatic, geographic, political, socio-economic features i.e. South-South



SELCO team visits an entrepreneur in Iringa region in Tanzania with the local stakeholders from Fraxen and KAKUTE during the scoping visit for on-ground implementation partnerships, July 2019



Mr. Francis Rwebogora, leads the discussions on building interlinkages with different energy ecosystem partners, Workshop in Iringa, 2019

cooperation.

It is intended that such a platform provides an impetus to synergize efforts in other countries such as Sierra Leone and Ethiopia where similar ecosystem programs are being explored with local partners. Also potentially opening up opportunities to expand thinking on this concept and loop in local partners to initiate programs on the ground mirroring the program in Tanzania.

The COVID pandemic has shown that varied successful responses not only came from Germany, New Zealand but also from South Korea, Taiwan, Vietnam and even regions within countries like Kerala in India. In light of persisting global power imbalances, reverse flow of bilateral or philanthropic aid towards addressing issues in host countries, there is an imperative need to stimulate local resources, ideas, youth, leadership in order to bring about solutions that take into consideration local communities, ecosystems and socio-economic conditions.

Achieving ambitious universal goals of sustainable development and fighting climate change will require learning from countries from “the South” and making them equal partners in the local, national and global development global priorities. At the crux of the C.S Mott Foundation and SELCO Foundation partnership is a commitment to change the lives of communities in a manner that brings about generational impact via holistic approaches and using SDG 7 as a catalyst.

Annexure 1: Partner Briefs

SAGCOT

SAGCOT or The Southern Agriculture Growth Corridor of Tanzania is a Public-Private partnership initiative in Tanzania with an aim to support innovative strategies to generate agricultural growth and poverty alleviation, through building successful partnerships between smallholder communities and agribusiness investors. In its broader mandate, it is a partnership designed to improve agricultural productivity, food security and agri-related livelihoods in Tanzania while ensuring environmental sustainability through commercialization of smallholder agriculture. SAGCOT Centre is the operational support system for SAGCOT partnership that builds partnerships with agribusiness companies, farmer organizations, civil society organizations (CSOs), and government agencies in developing the value chains of prioritized agricultural enterprises.

<http://sagcot.co.tz>

KAKUTE

KAKUTE Projects Co. Ltd. (KAKUTE) facilitates the development and application of innovative approaches and technologies for sustainable development. Their programs are based on sound commercial principles, and a belief in the effective design, manufacture, and marketing of productive technologies that will improve the lives of urban and rural communities of Tanzanians.

KAKUTE was one of the first from the non-governmental sector in Tanzania to engage in technology innovation and adoption at grassroot level and it has led the way on developing programs to support sustainable energy enterprises. . In the last few years it successfully incubated a solar power company, Mobisol, to graduate and grow to become a nationally recognized company with a unique service model and over 100,000 customers in Tanzanian and East Africa and employing hundreds of skilled Tanzanian workers.

<https://www.kakute.org>

IMED

IMED's mission is to support individuals and organizations to develop competencies and solutions that enable them to realize their full potential. Its vision is to become a role model in education and learning for enterprise development. Over the years, IMED Foundation has developed an in-depth knowledge and rich networks with actors in the entrepreneurship ecosystem in Tanzania including regulators, trainers, consultants, researchers, entrepreneurs who can serve as mentors, innovation and entrepreneurship projects, etc.

<https://imedtz.org>

TAMFI

Tanzania Association of Micro finance Institutions (TAMFI) is a not-for-profit umbrella organization for micro finance institutions in Tanzania. It was formally registered in 2001 as a sole network for microfinance activities in the country. Members include Commercial, Community and Microfinance Banks, NGOs, Private MFIs, SACCOS, apex of informal groups, micro -insurance company and Business Service Providers. The association seeks to develop capability of microfinance institutions and the microfinance sector in general through advocacy, lobbying, research and development, responsible micro finance, capacity building, and information gathering and dissemination. TAMFI's Mission is to facilitate the creation of an enabling environment for development of a sustainable microfinance sector through the participation of all stakeholders.

<https://tamfi.com>

Fraxen

FRAXEN Consult Ltd provides Renewable Energy and Business Consultancy Services to the public and private sector clients in Tanzania and abroad. Founded in 2016, the business is focussed on Renewable energy, Sustainable Forestry Management, Agribusiness and Business consultancy, including the promotion, design, training and installation of renewable

energy solutions to households and institutions, mainly solar products and clean-cooking solutions.

<http://fraxen.co.tz/about.html>

DBtech Tanzania

Don Bosco Youth Training Centre is registered as a Technical college accredited by Vocational education and Training Authority (VETA). The institution belongs to the Salesians of Don Bosco. It started its activities in Iringa in 1983. In line with the Salesian mission, the

centre trains young boys and girls for life with technical and life skills. Life skills of primary importance include faith, respect, love, justice, peace, personal discipline, interpersonal relationship, ethical principles, voluntarism, freedom, work ethics and behaviour, career options and so on. In addition, the center works with marginalized youth who are also materially poor, orphans and addicts, through vocational training. In total the center has produced 618 female graduates and 4330 male graduates from 1983 to 2019.

<https://dbtechafrika.org>



Delegates from Tanzania welcomed at SELCO's Manipal office during their visit to some of the sites in Coastal Karnataka, Nov 2018



SELCO Foundation seeks to inspire and implement solutions that alleviate poverty by access to sustainable energy to underserved communities across India in a manner that is socially, financially and environmentally sustainable.

SELCO Foundation demonstrates the role of clean energy and energy efficiency across wellbeing, livelihoods, health and education.

<http://www.selcofoundation.org/>