

Scoping study for a renewable energy skills development Public Private Development Partnership (PPDP) in Somalia



©SolargenTechnologies

Final Report

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Table of acronyms

AfDB	African Development Bank
CBS	Central Bank of Somalia
DFID	UK Department for International Development
FGS	Federal Government of Somalia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICT	Information and Communication Technology
ILO	International Labour Organization
IOM	International Organization for Migration
IPP	Independent Power Producer
KI	Key Informant
KII	Key Informant Interview
KIMS	Kaah Islamic Microfinance
kWh	Kilowatt hour
kWp	Kilowatt peak
kWs	Kilowatts
M&E	Monitoring and Evaluation
MoA	Memorandum of Agreement
MoU	Memorandum of Understanding
MWs	Megawatts
NABCEP	North American Board of Energy Practitioners
NGO	Non-governmental Organisations
O&M	Operations and Maintenance
PPDP	Public Private Development Partnership
PPP	Public Private Partnership
PV	Photovoltaics
R&D	Research and Development
RE	Renewable Energy
SARETEC	South African Research Energy Technology Centre
Seccco	Solar Energy Consulting and Construction Company
SERC	Strathmore Energy Research Centre
SHS	Solar Home Systems
Sida	Swedish International Development Cooperation Agency
ToT	Training of Trainers
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WASH	Water Sanitation and Hygiene

Executive Summary

This *Scoping Study for a Renewable Energy Skills Development PPDP Facility* seeks to understand how a PPDP (Public Private Development Partnership) training initiative can successfully bridge the renewable energy skills gap in the Somali power sector while ensuring a sustainable impact on the local population.

At USD1.2/kWh, average retail electricity prices for households are eight times higher than the regional average and among the highest globally¹. In combination with limited, highly decentralised power infrastructure that is restricted to independently run microgrids, electricity access is very low with latest estimates by the AfDB (2015)² estimating electrification at 16% of households. Most power is supplied by expensive diesel generators but there is a lot of interest in alternative renewable energy technologies, in particular solar PV, to displace at least part of diesel generation.

However, as confirmed in a 2016 survey by Shuraako, Somalia is lacking important technical skills to enable the deployment of renewable energy³. Technical skills are lacking across most parts of the value chain but especially in the areas of planning and design and installation as well as operations and maintenance. What is more, the wider power sector suffers from shortcomings in terms of health and safety, partly caused by an absence of regulatory frameworks to certify electricians.

With a dominant role of the private sector and limited influence of the government in Somalia's power sector, a PPDP as envisaged by Sida⁴ would be designed to address some of these challenges through the provision of technical skills training. But this intervention needs to be carefully designed and implemented to maximise impact. The purpose of this scoping study is therefore to answer the following research question:

How can a PPDP initiative successfully bridge the renewable energy skills gap in the Somali power sector while ensuring a sustainable impact on the local population?

In addressing this question via desk-based research and extensive stakeholder consultations with key actors from the private, public and donor sector, Samuel Hall has identified a number of key social, technological and economic challenges. A PPDP-led training centre could play an important role in addressing these:

- **The role of women in an emerging renewable energy market.** At present, 47.3% of women entrepreneurs in Hargeisa and Mogadishu have no formal education⁵. Promoting technical and business skills training for renewable energy via a training facility could prevent a “gender lock-in” from the start;
- **There is no one-size-fits-all technology solution for Somalia's power system.** The market starts from a low level of installed capacity of around 100MW and demand levels of 300W/connection,

¹ AfDB, 2015, Somalia Energy Sector Needs Assessment and Investment Programme.

² ibid

³ Shuraako, 2016, Powering Progress II: Realizing the Potential of Renewable Energy in Somaliland, Puntland and South Central Somalia

⁴ Sida, 2016, Terms of Reference for a Scoping study for a renewable energy skills development and Sida, 2016, Public Private Development Partnership (PPDP) – Sida internal guidelines – draft for Committee meeting (2016-09-16) Public Private Development Partnership (PPDP) in Somalia

⁵ ILO, (Undated) Institutional and Policy Assessment of Factors Affecting Women Entrepreneurs in Micro and Small Enterprises in Hargeisa and Mogadishu

with variations between cities and rural areas. Technical skills training needs to address diverse requirements in terms of technology size and type that are suited to rural areas and more densely populated environments. In addition to solar PV, due consideration needs to also be given to diesel generation, battery technologies, wiring and network operation, etc.;

- **Limited access to finance will hinder maximising economic benefits.** Economically, the deployment of renewable energy technologies has limited impact unless challenges around access to finance are resolved that will enable scaling up entrepreneurial opportunities as well as larger scale project deployment as Somali power demand evolves.

To address these challenges and maximise benefits for Somalia's population, the PPDP should take on a role that goes beyond mere on-the-ground technical skills training: Overtime, the proposed training centre could become a centre of excellence and focal point for Somalia's renewable energy and wider power sector. Such an approach would help addressing the policy and regulatory vacuum that is affecting Somalia's power market due to a lack of technical capacity at government level⁶. By taking a bottom-up approach to the formulation of policy and regulation in collaboration with other stakeholders, the training centre would lead efforts in developing important certification mechanisms and other frameworks.

Several careful choices need to be made to successfully implement a PPDP training centre. First, a committed and well established partner from the private sector needs to be selected who can provide the required input and support for designing and setting up the facility. Second, with several similar initiatives under discussion, coordination at donor level needs to be ensured. Existing training programmes in Kismayo, Mogadishu and Hargeisa should be carefully reviewed as to whether scaling-up is a possibility, rather than starting from zero. Third, to govern this process, the initiative needs a strong local liaison partner who can coordinate not just within the PPDP but also at wider regional level within Somalia.


Beyond a direct project partner, interaction with the wider private sector will help to develop a demand-driven initiative. Key players such as SolarGen, Secco, Golis Energy and Kaafi Solar can provide important market insights that will define the required number of trainees, and curriculum focus and scope. In addition, awareness raising campaigns across the wider population will contribute to stimulating demand for renewable energy products and establishing the basis from which installations can be scaled up as power demand grows.

Technical skills training is already taking place across Somalia, but it is primarily ad hoc and on-the-job within companies. A formalised teaching model should not lose this practical training component. Instead, a dual training model should be developed which combines classroom training with practical work placements in the industry. A survey among private sector players in Somalia confirmed interest in hiring interns but these placements should take place under guidance of the training facility until a routine can be established.

The training curriculum itself should train all relevant skills needs along the value chain, starting from basic skills for installation, operations and maintenance as well as reporting and then offering training for more advanced technical skills such as planning and design, diagnosis and troubleshooting as well as ICT. An alternative specialisation in business and entrepreneurial skills should also be offered.

Offering business skills training in addition to technical skills is important as it would on the one hand enable entrepreneurship in the market, and on the other hand ease entry for women into a more technical profession. Other recommendations by stakeholders to encourage women participation included women-only classes, subsidised course fees and targeted marketing. The facility should aim for 50% women graduates after Year 5, ideally sooner.

⁶ AfDB, 2015, Somalia Energy Sector Needs Assessment and Investment Programme.

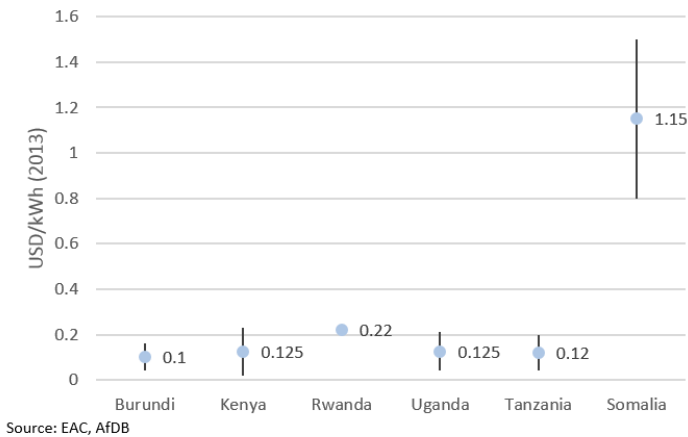


Women are perceived as hard working but limited in what type of roles they should take on in a technical sector such as renewables. One respondent from the private sector said that *“We will give priority to hire female technicians because they are honest and do the work sincerely”*. Many women are already active in the local economy with 60% of businesses in the informal sector run by women. This activity can be enhanced and formalised by easing access to finance. As financial independence is a major issue for women in Somalia, the PPDP should consider a microfinance facility that can provide start-up capital for graduates.

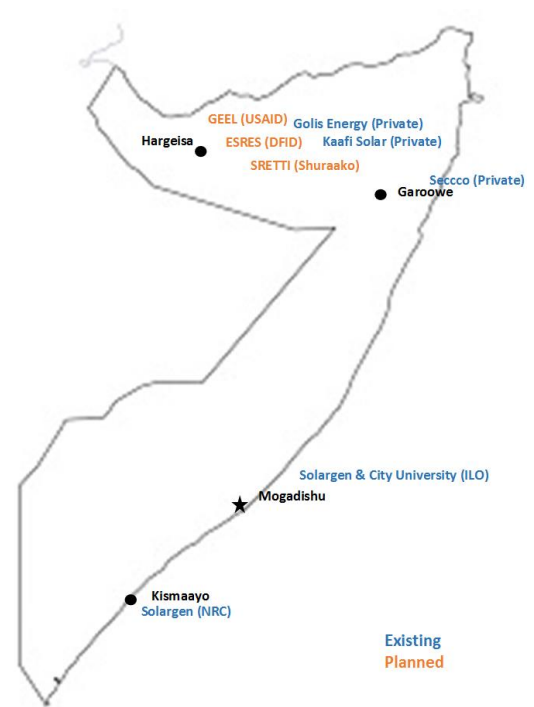
Availability of financial means for the facility was considered the main challenge in implementing this training centre by survey respondents and an early exit strategy may therefore not be a feasible solution. The implementation timeframe for this PPDP facility, depending on the donor’s ambitions as well as political context, should be 2 to 5 years with an initial three-year budget of USD1.9million. Continued monitoring and evaluation of the training facility should take place to help assess performance against a pre-defined set of indicators.

Infographic: Renewable Energy Skills Training PPDP in Somalia

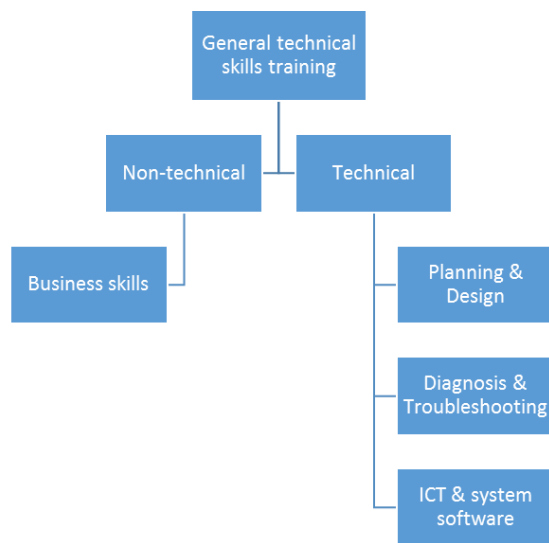
Retail electricity prices in East Africa



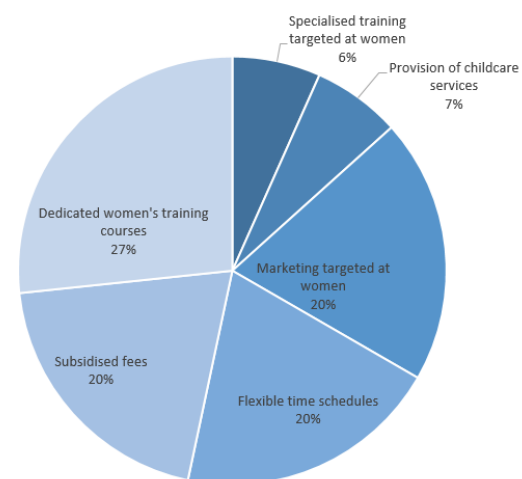
Renewable energy skills training initiatives across Somalia



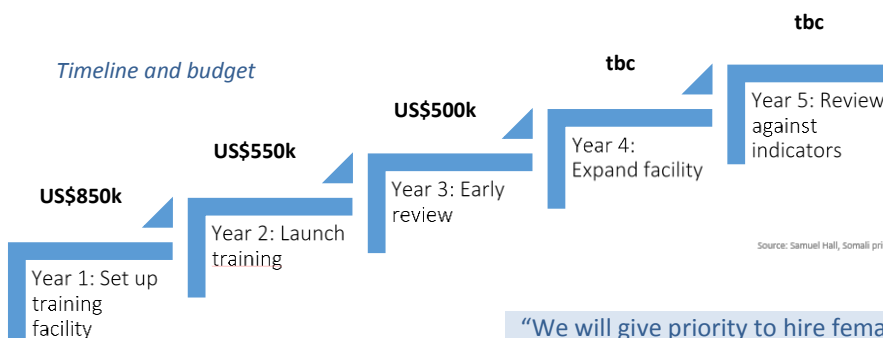
Proposed curriculum design



"What is the best way to encourage women's participation in technical training?"



Timeline and budget



Source: Samuel Hall, Somali private sector energy companies

"We will give priority to hire female technicians because they are honest and do the work sincerely"
(Somali power company)

1. Introduction

This report concludes the *Scoping Study for a Renewable Energy Skills Development PPDP Facility in Somalia* for which Samuel Hall has been commissioned by the International Labour Organization (ILO) and the Swedish International Development Agency (SIDA). It is the final report and represents the third and last deliverable for this study.

At USD1.2/kWh, average retail electricity prices for households are eight times higher than the regional average and among the highest globally⁷. In combination with limited, highly decentralised power infrastructure that is restricted to independently run microgrids, electricity access is very low with latest estimates by the AfDB (2015)⁸ estimating electrification at 16% of households. Most power is supplied by expensive diesel generators but there is a lot of interest in alternative renewable energy technologies, in particular solar PV, to displace at least part of diesel generation. However, Somalia is lacking important technical skills to enable the deployment of renewable energy⁹. What is more, the wider power sector suffers from shortcomings around health and safety, partly caused by the limited regulatory frameworks to certify electricians.

With an important role of the private sector and limited role of the government in Somalia's power sector, a PPDP as envisaged by Sida¹⁰ would be designed to address some of these challenges, in particular for the provision of technical skills training.

The purpose of this scoping study is therefore to answer the following research question:

PPDP Definition: SIDA's PPDPs (2016) "aim to engage the private sector in proactively committing to developing countries through investments, trade, technology transfer and problem solving". In a PPDP, the public and private sectors make a joint investment in a project implemented by a third party. The objective is to create "win-win situations where projects are commercially driven while generating significant improvements for people in poverty". A PPDP for skills development in the renewable energy sector can draw effectively on both the private and public sector.

How can a PPDP initiative successfully bridge the renewable energy skills gap in the Somali power sector while ensuring a sustainable impact on the local population?

The report takes the following structure:


- (1) summarises the methodological approach and provides the conceptual framework applied to this study;
- (2) elaborates on the rationale for this study, providing further background to Somalia's emerging renewable energy sector
- (3) reviews the social, technological and economic challenges which affect Somali society and the deployment of renewable energy;

⁷ AfDB, 2015, Somalia Energy Sector Needs Assessment and Investment Programme.

⁸ AfDB, 2015, Somalia Energy Sector Needs Assessment and Investment Programme.

⁹ Shuraako, 2016, Powering Progress II: Realizing the Potential of Renewable Energy in Somaliland, Puntland and South Central Somalia

¹⁰ Sida, 2016, Terms of Reference for a Scoping study for a renewable energy skills development and Sida, 2016, Public Private Development Partnership (PPDP) – Sida internal guidelines – draft for Committee meeting (2016-09-16)

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- (4) reviews what role a PPDP can play to address some of the challenges facing renewable energy in Somalia;
 - (5) offers a critical review of PPDP initiatives in general;
 - (6) provides a mapping of the stakeholders who have been interviewed and who have informed and validated large parts of this study;
 - (7) the PPDP structure is outlined in the context of SIDA's tested framework and proposals are made for the overall set-up and curriculum;
 - (8) an implementation roadmap is presented, identifying milestones and requirements for a successful roll-out of the facility;
 - (9) the conclusion will offer key recommendations to Sida and ILO to make the proposed training facility a success

As part of the Annex, Samuel Hall provides a contact details for key stakeholders, a bibliography of the literature reviewed for this study and an overview of other donor initiatives addressing renewable energy skills in Somalia.

2. Methodology: Conceptual framework

This scoping study has taken a bottom-up approach to identify the skills needs of local players as well as their ability to contribute to a PPDP initiative for renewable energy skills development. In addition, extensive background research has been carried out to provide the necessary contextual analysis to lay the groundwork for a sustainable implementation process.

The overall methodological approach focused primarily on the use of Key Informant Interviews and Secondary Literature Review to gather information. This was complimented with specific tools delving deeper into research questions. The team undertook a three-phase process to conduct this research:

Figure 1 Methodological Approach in Three Phases



PHASE 1: Literature review and case studies

As part of the inception process, Samuel Hall undertook a thorough literature review and surveyed a number of case studies that will provide relevant insights to the project. Especially understanding the details and lessons learnt of previous donor initiatives and drawing on case studies informed the design of the proposed PPDP facility.

To select relevant literature for review, we used the following four step approach:

Figure 2 Approach to Literature Review



- **Identification:** The literature review began with scanning and identifying all publications that may be relevant to the scoping study. This process started with the publications and documents sent by ILO and Sida, followed by a wider scan of publications from donors and academia.
- **Screening:** This step involved scanning the abstracts and executive summaries to select the most relevant publications.
- **Eligibility:** The full text of selected publications and documents were assessed for eligibility in the scoping study.
- **Included:** The final step selected publications and documents that have been included in the scoping study.

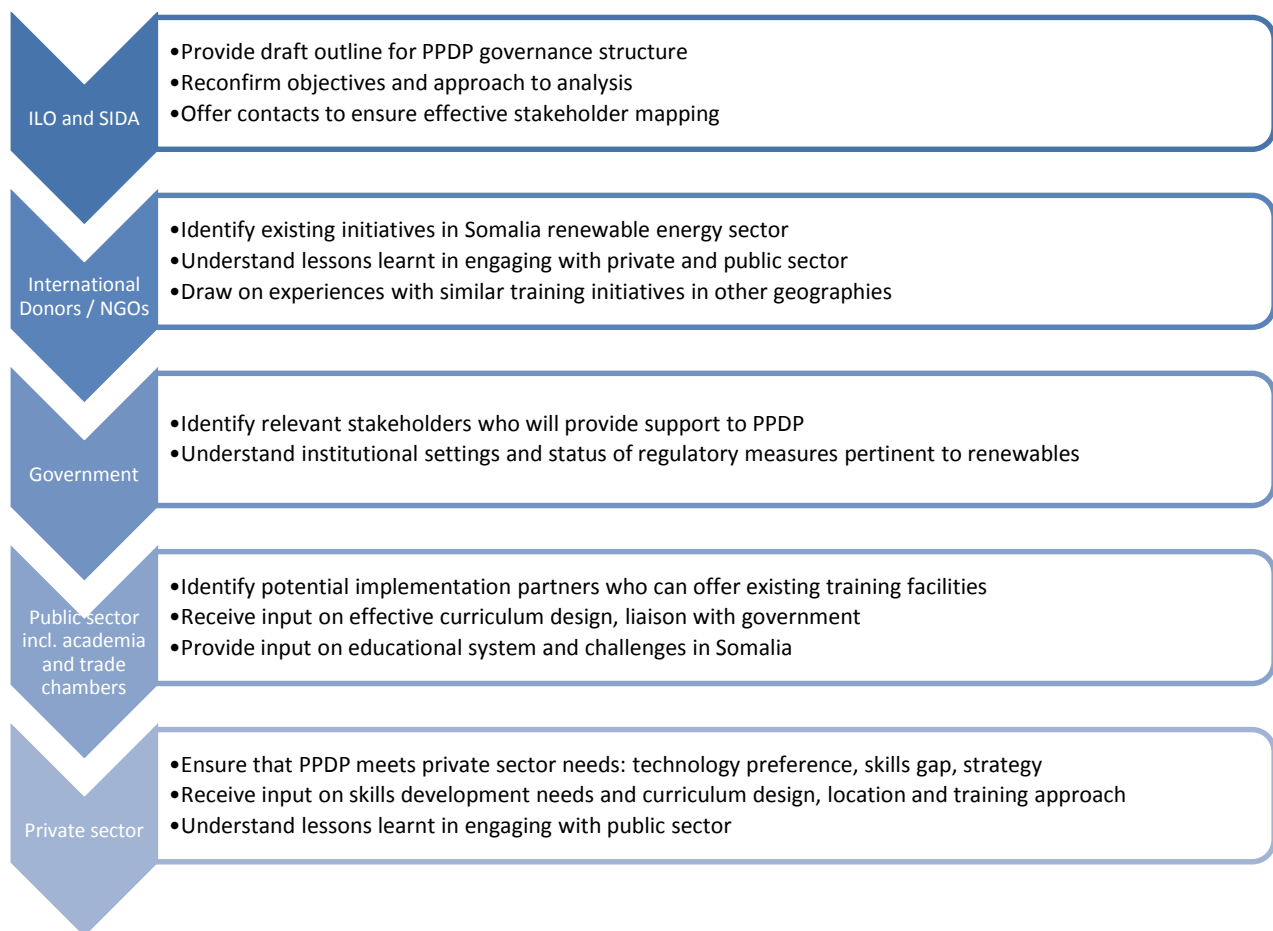
Additional literature was selected throughout the research process to inform specific points. A bibliography has been included in the Annex. A similar process was applied for the selection of a number of case studies which served as sources of lessons learnt and best practice.

PHASE 2: Stakeholder mapping and Key Informant Interviews

Samuel Hall undertook a stakeholder mapping exercise and had developed an initial short-list of Key Informants in collaboration with the client, but the list grew and was amended throughout the process to gather additional insights. KII guidelines were also developed to guide conversations.

The purpose of the KIIs was to gather insights especially around private sector needs. We therefore applied a systematic approach to conducting interviews by starting with high-level actors (client, donors) and progress via key experts (case studies, academia) to on-the-ground players (project developers, IPPs). Figure 3 presents the four stakeholder groups in addition to the client (ILO and SIDA) as well as their expected input during the KIIs.

Figure 3 Stakeholders Contribution to Study



For the KIIs, we took a two-stage approach to Phase 2, carrying out an initial set of KIIs, followed by more in-depth conversations with relevant stakeholders and a wider survey with detailed questions to all interviewees. We promised to conduct a minimum of 25 KIIs and in total undertook 35 initial KIIs and 10 follow-up discussions to verify our initial findings.

Overall, conversations flowed easily and respondents were keen to share their viewpoints and especially the interviewed private and public sector actors offered their support to the facility. While we feel confident that we reach all key actors in the Somali renewable energy sector and several important IPPs in South Central, we would however have liked to speak to some of the smaller IPPs and players with a general electricity, rather than renewable energy focus to obtain a more comprehensive picture of technical skills.

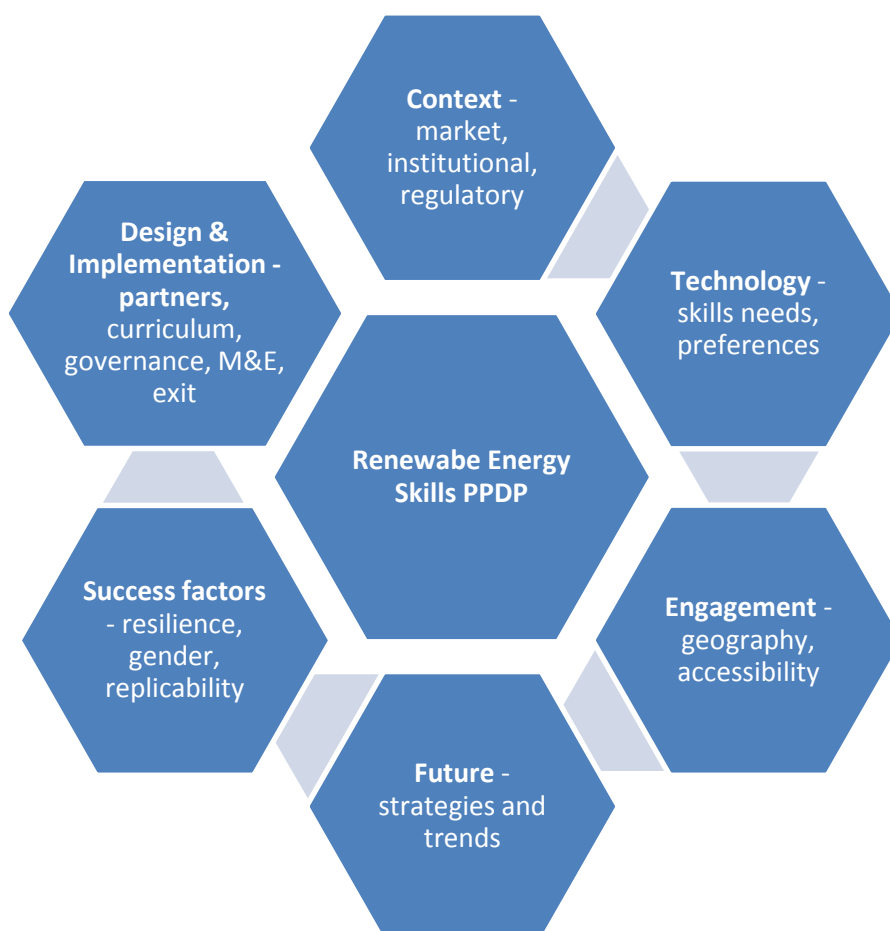
The concern is that some of the responses were biased against the private sector players' own business interests. For example, a tendency towards bias emerged with regard to the best location for a training facility.


Our follow-up survey yielded interesting results, yet the representativeness of the survey results for the wider private sector is limited as only five out of 22 players responded. Questions were designed and formulated to test assumptions with the private sector in Somalia and centred on aspects of the contextual setting and the PPDP design. Results have been included throughout this report where they offer useful input to the wider discussion but should always be treated with caution.

PHASE 3: Analysis & Reporting

The analytical part of the study focused on identifying key recommendations from the stakeholder mapping and KIIs and feeding these into the draft PPDP design as well as the proposed implementation roadmap. The analysis followed a number of key research themes early on in the process as outlined in Figure 4 and below. These key themes were also instrumental in guiding the overall discussions with stakeholders and the client and are ultimately reflected in the structure of this final report.

Figure 4 Key Research Themes





We assessed the **contextual setting** against which the PPDP is to be developed. An effective development of the PPDP requires a clear understanding of all actors to be involved in the PPDP as well as the status of renewables market development in Somalia and the overall challenges faced by the industry. Regulatory requirements such as accreditation and licensing will also be important aspects to be covered.

In order to develop an effective curriculum, **technology** preferences need to be identified together with the associated skills requirements along the value chain.

Closely linked to this enquiry was the extent of **engagement** that stakeholders are able and willing to provide for the PPDP, relating to the physical location of the facility as well as the way that stakeholder can actively engage in its development (given challenges for remote actors to access the facilities depending on its location).

To ensure long-term success, a forward-looking approach by identifying strategies of private sector players as well as donors and taking into account technology and market trends that may require **future** adjustments to the PPDP design.

Similarly, **success factors** need to be taken into account to ensure positive effects on resilience, the importance of gender balance, but also possible replicability of this PPDP elsewhere. Indicators have been identified that will aid future monitoring and evaluation of the facility.

All these aspects feed into the draft **design** of a PPDP facility as well as a proposal for an **implementation** roadmap. Crucially, both make very practical suggestions for potential partners, highlight aspects to be covered in the curriculum and teaching approaches, and draw up an appropriate governance structure. Last but not least, the implementation roadmap also suggests an exit strategy for the involved donors.

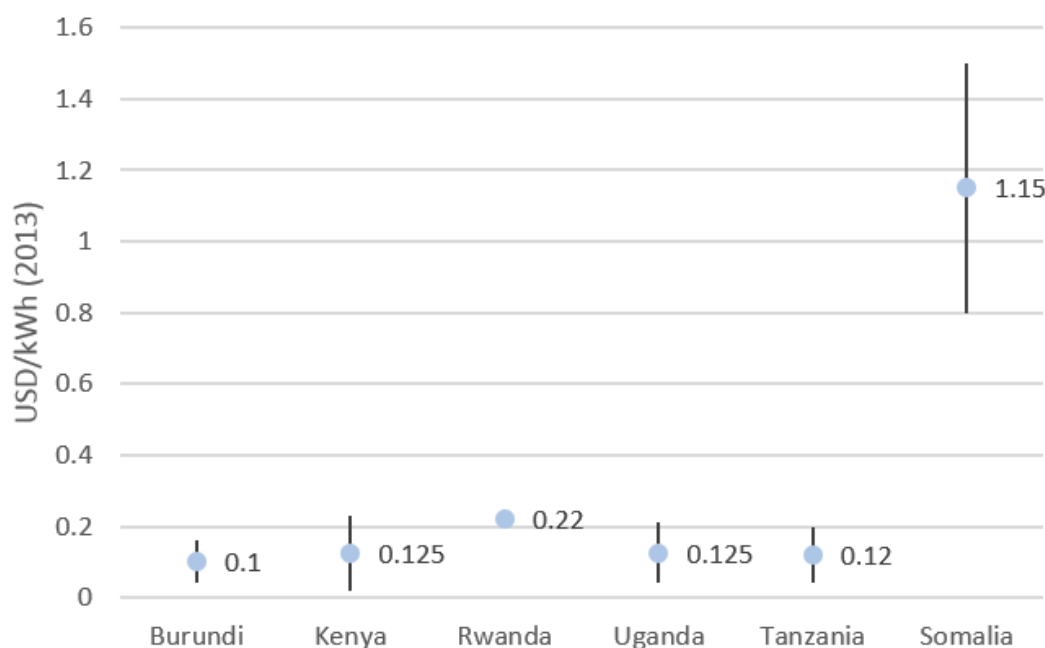
3. Rationale for a skills training initiative

The following section outlines the current situation of the Somali electricity market and provides a rationale for an intervention to establish a technical skills training initiative for renewable energy.

Somalia's renewable energy and wider power sector

The Somali power sector is characterised by a high degree of decentralisation with numerous private sector players, a limited regulatory framework and high costs. Most power supply stems from diesel generators provided by small IPPs, with households and commercial consumers paying up to \$1.5 per kWh¹¹ – among the highest prices for power globally and eight times the regional average (most markets in the region will offer below-cost regulated prices). Cheaper and cleaner alternatives exist but a lack of skilled labour has been a key challenge facing IPPs and project developers in further expanding power supply to include renewable energy sources.

Figure 5 Retail electricity prices in East Africa



Source: EAC, AfDB

Meanwhile, grid-scale renewable energy projects, as well as offgrid and microgrid installations using renewable energy sources such as solar PV and Solar Home Systems are becoming increasingly prominent in neighbouring markets. The cost of technology has come down substantially, with module prices reducing by around 80% between 2009 and 2015¹² (see Figure 6) and projections pointing to further reductions¹³.

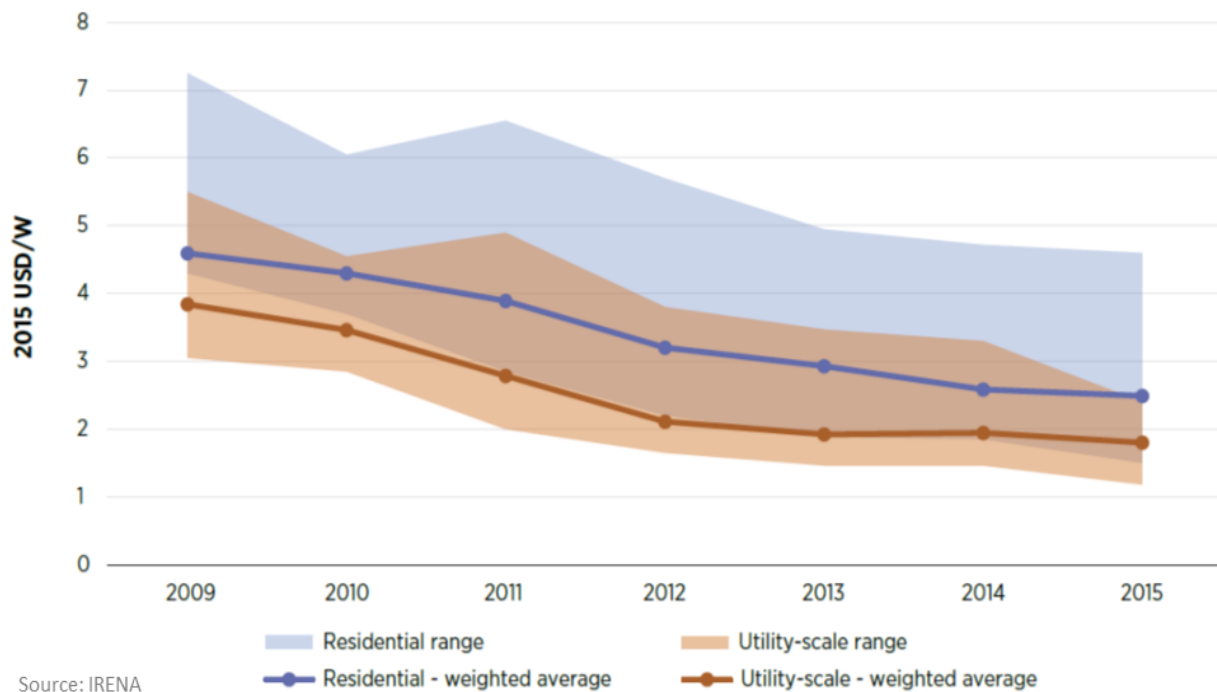
¹¹ East African Community, 2014, Regional Scoping Study to Identify Potential Areas for Intervention by the EAC Secretariat on Renewable Energy and Energy Efficiency; Shuraako, 2016, Powering Progress II: Realizing the Potential of Renewable Energy in Somaliland, Puntland and South Central Somalia. **NB:** Somali electricity bills often reflect the number of appliances within a person's home. Powering a 50W lightbulb for roughly six hours per day will cost around USD10 per month, translating into a price of USD1/kWh.

¹² IRENA, 2016, Solar PV in Africa: Costs and Markets

¹³ The cost of wind energy has also decreased overtime but it should be noted that the technology costs for e.g. biomass and geothermal technologies have largely stagnated as learning curves for these technologies have flattened.

This makes alternative sources of energy such as solar an attractive option compared to conventional fuels. Indeed, a study by the Africa-EU Renewable Energy Cooperation Programme stated that “renewable energy technologies not only present a more future-oriented technology choice but are in addition a promising way for expanding access to electricity to a larger part of the population (both on and off the grid)”¹⁴.

Figure 6 Installed cost ranges for residential and utility-scale solar PV in major markets



Source: IRENA

Electricity access is low across Somalia. The World Bank¹⁵ estimated an electricity access rate of 32.7% across Somalia for 2012 but a 2015 AfDB report puts this figure at around 16%. Electricity access also varies greatly across cities and regions. Other sources state that 80% of households in Hargeisa and about two-thirds in Mogadishu. However, 95% of the poorest households across Somalia are said to have no access at all¹⁶. Expanding electricity access can have substantial benefits for the local population, and especially women (see section on socio-techno-economic challenges).

One of the main obstacles to expanding electricity via the deployment of renewable energy technologies in Somalia is a lack of technical capacity. Narrowing this skills gap has the potential to create green jobs, which could support the expansion of the RE sector, lower energy prices and ultimately boost economic growth. A survey by Shuraako in 2016¹⁷ interviewed stakeholders in the private sector across Somalia on their views

¹⁴ Africa-EU Renewable Energy Cooperation Programme, 2014, Vocational Training for Renewable Energy in Africa

¹⁵ World Bank, <http://data.worldbank.org/indicator/EG.ELC.ACDS.ZS>, accessed 30th November 2016

¹⁶ REEEGLE, <http://www.reegle.info/policy-and-regulatory-overviews/SO>, accessed 30th November 2016

¹⁷ Shuraako, 2016, Powering Progress II: Realizing the Potential of Renewable Energy in Somaliland, Puntland and South Central Somalia

with respect to education and training, with 80 to 90% of respondents stating that skilled technical experts were unavailable and most expressing limited faith that this would change in the future (see

Figure 8).

Figure 8 Shuraako survey responses on education and training

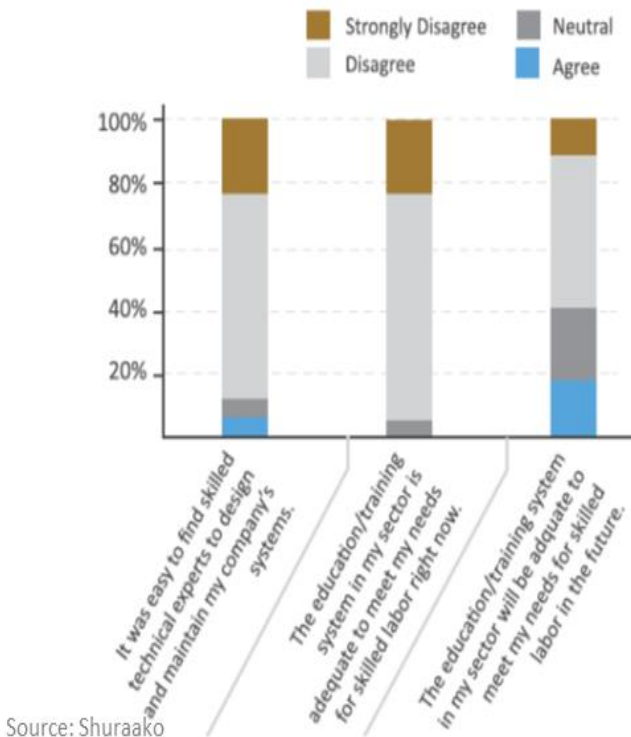
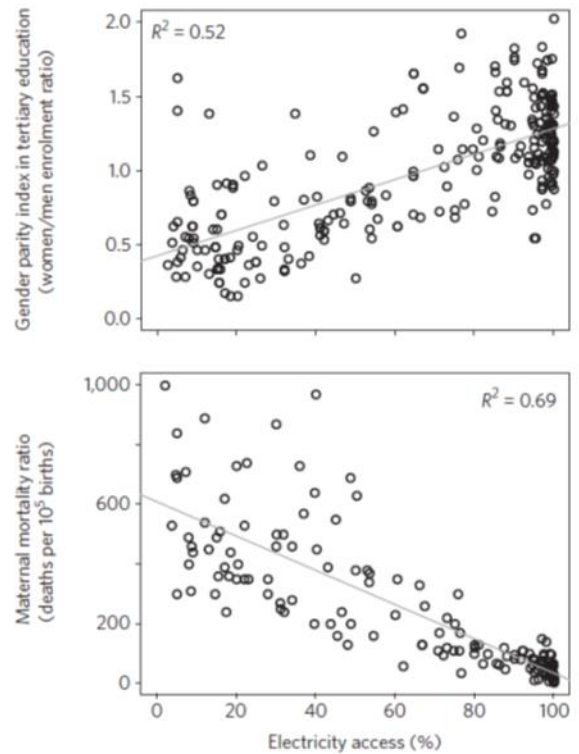


Figure 7 The relationship between access to electricity and selected MDG indices for 2000–2010



The lack of technical skills is not limited to the renewable energy sector but extends to the wider power sector. Health and safety due to poor wiring was pointed out by stakeholders as an important and widespread issue and further research may need to be carried out to understand the extent of this issue. A culture of sub-contracting technicians for installation work intensifies the issue as there is no certification mechanism in place to ascertain an electrician's skills. It is essential for the well-being of electricity consumers in Somalia that all electricians, technicians, and engineers installing electrical equipment become certified.

The deployment of renewable energy technologies can create synergies between humanitarian and development aid, as suggested by one stakeholder: especially offgrid renewable energy technologies for lighting and water pumping can address the low to non-existent energy access in rural areas and as such potentially act as a stabilisation factor by offering an anchor point for people that may otherwise be forced to migrate to urban areas. This topic would need further analysis but academic research points to substantial social benefits through energy access, especially for women and gender equality: a lower

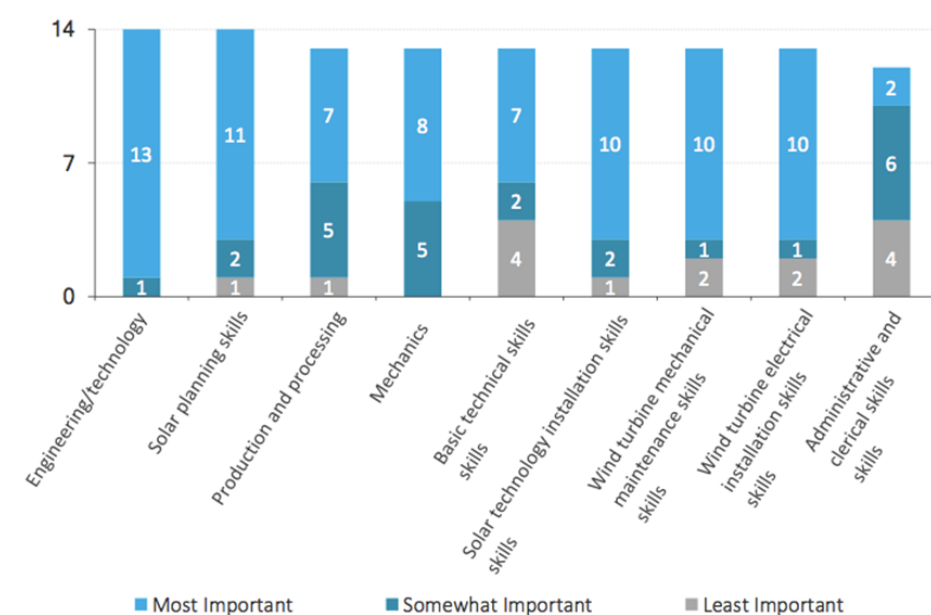
maternal mortality ratio in child birth is correlated with increased electricity access and the men/women enrolment ratio in tertiary education also improves with greater access to electricity (see [Figure 7](#))¹⁸.

Technical skills gaps

Shuraako conducted a workforce survey in early 2016¹⁹ with fourteen renewable energy companies to identify the labor market needs required to support and expand the Somali renewable energy sector. This survey not only confirmed the existing technical capacity gaps in the Renewable Energy sector as a major challenge, but also identified the specific skills gaps in the workforce.

The study found skills gaps across the entire value chain with limited variation in relevance for the private sector. In terms of specific technical skills, almost all types of technical skills are equally pressing gaps to be resolved. Technical experts with these skills were identified by most companies as positions that will need to be urgently filled in the next 2 to 5 years. Figure 9 explicitly sets out the major technical skills gaps that currently exist in the surveyed companies. Samuel Hall’s survey confirmed these skills gaps and found that installation skills as well as planning and design were among the most pressing skills to be trained.

Figure 9 What are the major technical skills gaps that currently exist in your company?



¹⁸ Alstone, P, Gershenson, D and Kammen, DM, 2015, Decentralized energy systems for clean electricity access, *Nature Climate Change*, 5, 305-314. NB: All of the data points are on a country level for a particular time. The coefficients of determination (R2) values for the full-sample linear regression are displayed on the figure panels.

¹⁹ Blume M, Westhof, S (2016) *Somali Renewable Energy: Skilled Workforce Survey*, Shuraako and Forcier Consulting.

4. Key socio-techno-economic challenges

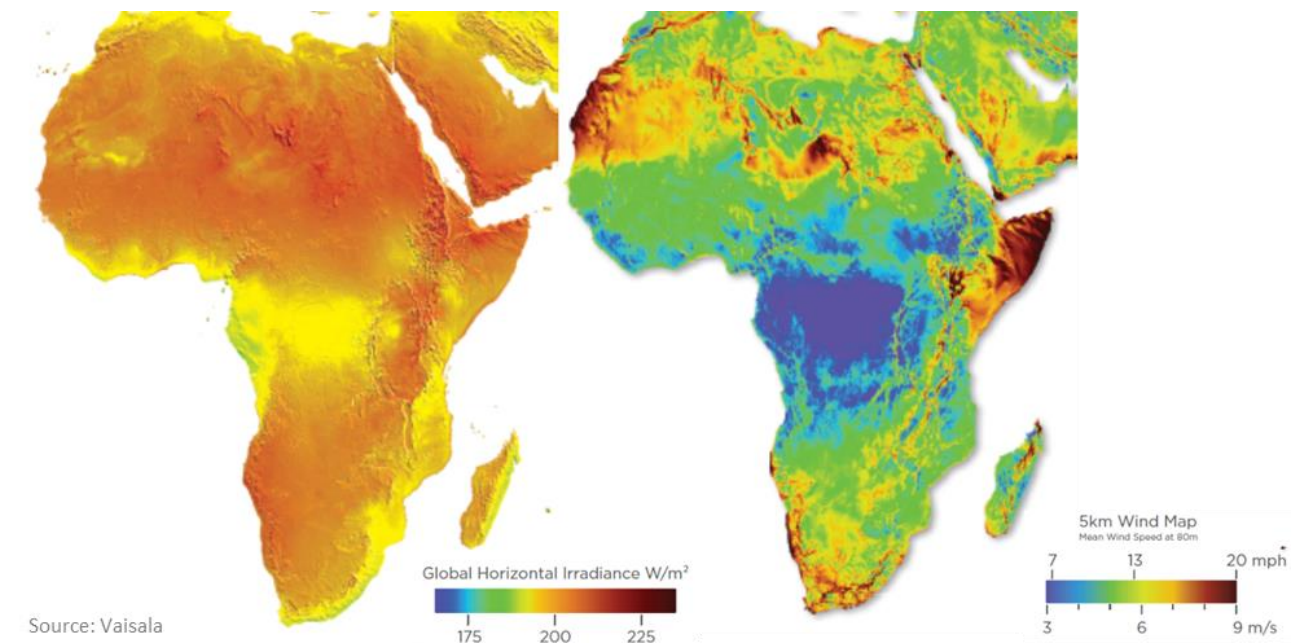
Throughout the literature review and in conversations with stakeholders, Samuel Hall has identified key technological, economic, and socio-cultural challenges that will be relevant for a PPDP-led training centre to take into account and address where possible. This section specifically on three major obstacles to the development of a sustainable and socio-economically inclusive energy sector in the country: technological, financing, and gender-related challenges.

Technology

Somalia's resource potential for both wind and solar is substantial (see Figure 10). However, despite strong resources for wind, solar PV appears to be the preferred technology. Continued global technology cost decreases (see Figure 6 above) and existing market activity with supply chain access to manufacturers for equipment make it an interesting solution for scale-up.

Stakeholders gave various reasons during the KIIs why solar PV is the preferred option over wind turbines: Wind power is considered too difficult to develop in the current environment, with more complex technical skills needs, longer lead times compared to solar PV projects and higher maintenance cost. The wind installations that have been installed in Somalia are not operating. Onshore and offshore wind turbines are also typically the size of several MWs – too large for Somalia's current demand situation of a few hundred watts per connection and limited industrial demand. Geothermal, for which potential was highlighted, has similar constraints in terms of the size of installations to make them economically viable. Both options should be considered for the medium-term once Somalia's power demand has scaled up – but technical skills training should prioritise the low hanging fruits at this stage.

Figure 10 Irradiance and wind speeds across Africa²⁰

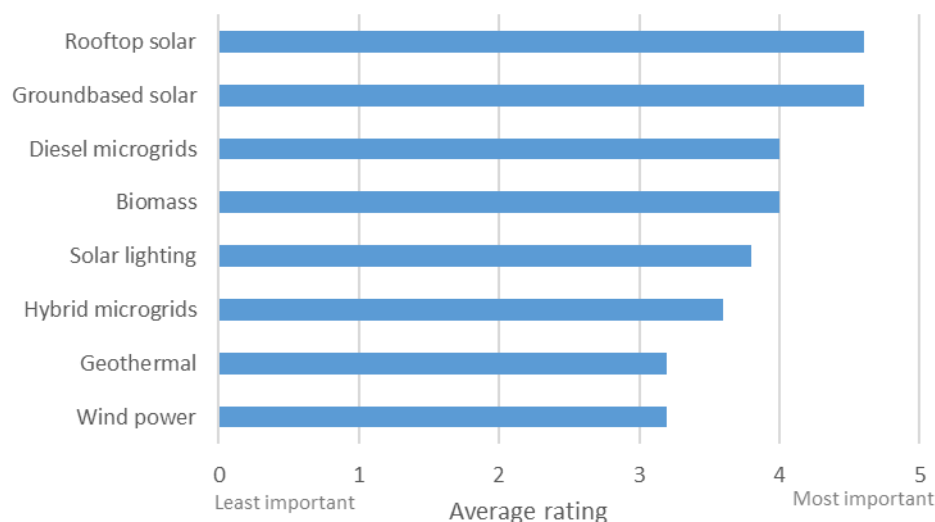


²⁰ Vaisala (2015) 3Tier Global wind and solar resource maps

The preference for solar PV as the main technology training focus was confirmed by our follow-up survey (see

Figure 11) where respondents stated that rooftop and ground-based solar PV installations should be prioritised in the training curriculum. However, interestingly, diesel and biomass generation featured over solar lighting products.

Figure 11 Survey question - What is your technology preference for skills training?



Source: Samuel Hall, Somali private sector energy companies

Two reasons can explain this response (but should be confirmed during curriculum development): (1) solar lighting products are much smaller scale and less technically complex than larger systems of several kW and therefore require less technical skills training – especially those that are portable, integrated systems that require limited or no in-house wiring; (2) diesel has repeatedly been highlighted as an important area where skills are lacking and expensive technical experts have to be imported to fix problems. With solar PV only producing electricity at day-time, diesel generators will continue to be required to supply power at night-time. Biomass-fired boiler technology can also provide this kind of base-load capacity.

Power generation needs to be appropriately sized to meet Somalia's power demand while allowing room to scale as demand increases overtime. Current installed capacity in Somalia is 100MW with 250,000 connections, translating into around 300W/connection²¹ – the equivalent to e.g. six light bulbs. Solar PV offers a wide range of technology sizes (from a few Watts to Megawatt-sized installations) that can be deployed according to Somalia's diverse power needs. This is especially relevant where households start out from no electricity access or a very low level and will require only a small solar home system at first that can then be scaled up, compared to the size of installations required in the organically grown city microgrids in Mogadishu and Hargeisa where solar can for example also reduce the use of diesel fuel.

In the solar energy sector, different value chains exist that come with different skills requirements²². For example, larger, grid-connected solar PV projects compare differently to the skills needs for deploying small solar home systems (SHS) and pico solar products (such as solar lanterns): the former will require a more complex planning and design process according to demand needs, while the latter is typically a standardised

²¹ AfDB, 2015, Somalia Energy Sector Needs Assessment and Investment Programme. NB These numbers are estimates and AfDB assumes that they overstate demand – more detailed or reliable data is currently not available.

²² Africa-EU Renewable Energy Cooperation Programme, 2014, Vocational Training for Renewable Energy in Africa

size. Another layer of complexity is introduced with microgrids that often take a hybrid approach to energy generation by for example integrating solar PV with a diesel generator or a battery to provide back-up at night time. Each of these approaches to energy provision come with varying value chains and different skills requirements.

Among the different applications for solar, offgrid solar installations featured strongly among respondents, due to the limitations on third-party access to the existing privately owned grids in more populated areas. However, players operating existing microgrids are also very interested or already active in integrating solar PV into existing systems, too. Offgrid solar technologies comprise, for example, rooftop and ground-based solar PV installations that don't connect to a main grid, solar home systems and pico solar lanterns as well as solar water pumping and cooling. A representative from the WASH (water, sanitation, hygiene) cluster pointed out that solar water pumping in particular would require complementary skills development – at least at basic level – around hydraulics, so that solar technicians can effectively work with water experts in installing and maintaining these systems.

There is an interest in microgrid development in rural areas. Synergies can be created where several small systems (e.g. a rooftop PV panel and a solar water pumping system) can be integrated for smaller sites to operate together (

Figure 12). In addition, given the challenges around access to finance for consumers, and particularly for women, innovative payment systems need to be put in place to enable deployment of power systems especially in rural areas. Taking a forward-looking view, additional technology focus should therefore be placed on:

- Metering and telecoms and communications technology for systems that are being sold as pay-as-you-go systems and are grid-tied;
- Design software and operating software for more complex grid-tied systems; and
- Back-up generation for solar PV, in the form of a diesel generator or a battery, to provide power at night time;
- Network development and wiring with due attention to health and safety standards in the installation and operations and maintenance process.

Figure 12 Evolution of offgrid power systems



Financing

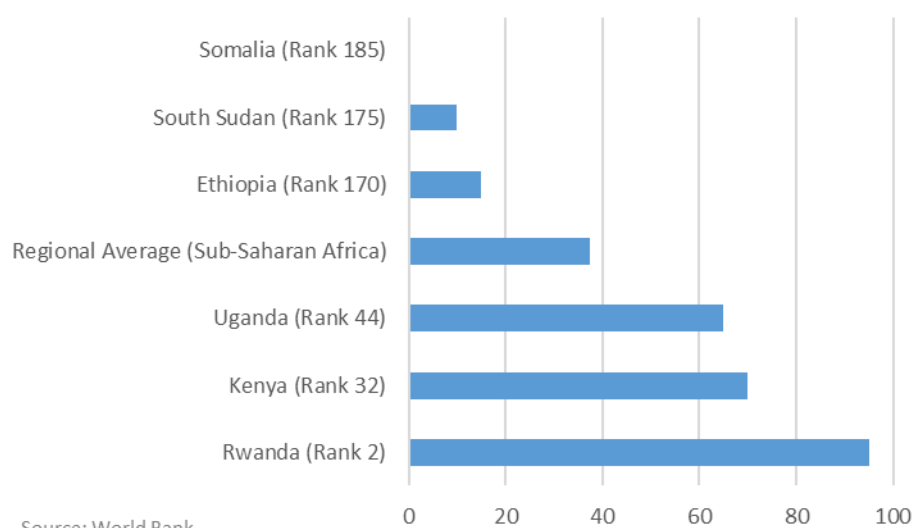
Somalia lacks a robust financial sector, which has contributed to the limited financing options experienced by most small to medium businesses. This lack of credit has constrained many Somali businesses from expanding. In the early 1990s the banking system in Somalia collapsed, along with depositors' money. Without a robust financial sector and eroded public trust in the banking system, unregulated private money transfers and mobile money operators emerged to provide financial services²³.

²³ World Bank (2015) Somali Economic Update: Transition amid Risks with a Special Focus on Intergovernmental Fiscal Relations

In 2009, in an effort to strengthen the financial sector, the Federal Government of Somalia (FGS) reopened the Central Bank of Somalia (CBS). The government has since passed a Financial Institutions Act (FIA 2012) in 2012 which established a framework for financial institutions to operate in Somalia, supervised by the CBS. In 2015 the CBS recognised 48 financial institutions, of which six were licensed banks and nine were registered Money Transfer Operators. The Central Bank also defined 17 institutions as unregistered and unlicensed Money Transfer Operators - these are still operating but informally. In addition, and 12 banks are in the process or have expressed interest in registering²⁴.

Although the financial sector is growing, access to finance remains limited in Somalia²⁵. The lack of credit is a major constraint for business expansion, particularly for small to medium enterprises^{26 27}. The Doing Business 2017 report ranks Somalia at 185 in the ranking of 190 on the ease of getting credit. This index is a measure of 'how well regulations and institutions in Somalia support lending and borrowing'²⁸. Figure 13 shows Somalia's score at 0, compared to a regional average of 37.5 in Sub-Saharan Africa. By contrast Rwanda is ranked at 2 out of 190 with a score of 95.

Figure 13 Ease of getting credit in 2016



Similar results were found in a 2013 market study conducted by KIMS. The study showed that less than 5% of Somali small to medium enterprises 'meet their needs for finance'²⁹. Instead, businesses in Somalia use their own funds, borrow from their social networks or depend on remittances.³⁰

This lack of finance also impacts the renewable energy sector. Shurakoo's 2016 survey of renewable energy companies found that over 50% of respondents identified limited access to finance as a significant challenge to their expansion. The limited finance options also constrain company's ability to train staff³¹. This was further emphasised in a number of KI's with one respondent emphasising that 'Finance really has to be addressed as part of any renewable energy initiative. You have to address the lack of finance the private sector faces in Somalia.'

²⁴ ibid

²⁵ AfDB (2015) African Economic Outlook

²⁶ World Bank (2015) Somali Economic Update: Transition amid Risks with a Special Focus on Intergovernmental Fiscal Relations

²⁷ USAID (2014) Assessment Report: Somalia Economic Growth Strategic Assessment

²⁸ World Bank (2016) Doing Business Report 2017: Equal Opportunity for All Somalia

²⁹ KIMS (2016) Kaah International Microfinance Services Bringing Electricity to Somalia through Solar Microfinance

³⁰ World Bank (2015) Somali Economic Update: Transition amid Risks with a Special Focus on Intergovernmental Fiscal Relations

³¹ Blume M, Westhof, S (2016) Somali Renewable Energy: Skilled Workforce Survey, Shuraako and Forcier Consulting.

To ensure resilient outcomes of graduates from the training facility, access to finance (i.e. working capital) must be adequately addressed. Otherwise entrepreneurship skills training alone will not be sufficient to promote entrepreneurial job opportunities. This lack of finance is particularly acute for women (see *The role of women in Somalia's economy* for more details). Microfinancing can help address the latent demand with affordable financing. Research has shown that the lack of access to microfinance institutions can be a barrier to entrepreneurs establishing businesses³².

Microfinance in Somalia does not come without its challenges in Somalia. Historically, microfinance has not been sustainable in Somalia having been primarily operated by NGOs and charities without strict compliance processes in place³³. This has led to clients missing payments and defaults. New commercial players have emerged that are both commercially oriented and sustainable who offer microfinance options to customers. These include KIMS, Micro Dahab, the Salaam Somali Bank, and the International Bank of Somalia.

The role of women in Somalia's economy

The role of women in Somalia's emerging renewable energy market needs to be placed into the wider context of challenges for women empowerment in Somalia. Promoting skills training in renewable energy in Somalia not only enables the expansion of cheaper and greener forms of energy but it can also provide women with employment opportunities helping to address other development goals, such as socio-economic inclusion.

Socio-economic inclusion: The AfDB states in its 2014 Annual Report that *"To make growth more inclusive, Africa needs to create more opportunities for quality and productive employment. This entails removing barriers to the full participation of individuals, groups, and regions in income-generating and welfare-enhancing activities. Access to economic opportunities must also not be defined by age, gender, religion, ethnicity, culture, or geographic location"*. (AfDB, 2014)

Gender promotion: UNICEF refers to gender promotion as *"levelling the playing field [through] working directly with girls and women to address historical and present inequalities (affirmative action), as well as efforts to ensure that girls and women, and boys and men, define and benefit from mainstream development efforts (gender mainstreaming)"*. (UNICEF, 2010)

Socio-economic inclusion and gender promotion in Somalia

Women in developing countries are less likely to be in employment, tend to occupy low paid and insecure work, and often earn less than men for equivalent work. They also tend to spend more time than men carrying out work in the private sphere (childcare and household activities)³⁴. These disparities are particularly pronounced in Somalia as a result of its deeply patriarchal society. Based on latest UNDP figures, gender inequality in Somalia is high at 0.77 out of a value of 1 (complete inequality), and globally Somalia ranks as fourth lowest on the gender inequality scale³⁵ (see Figure 14).

³² Ali, A. H. et al. (2013): The Accessibility of Microfinance for Small Businesses in Mogadishu, Somalia. International Journal of Humanities and Social Science. Vo. 3, No. 11, p.1

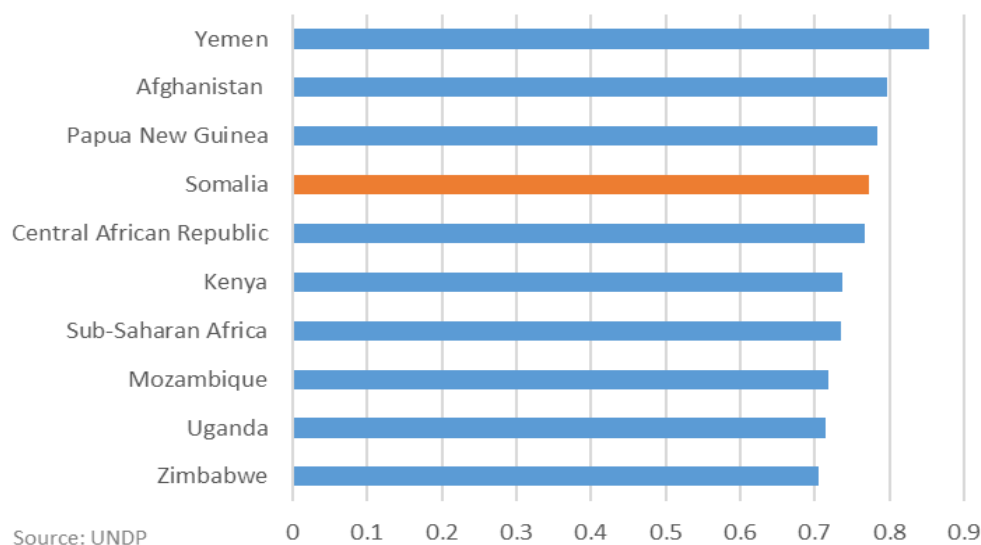
³³ ODI (2016) Accelerating access to electricity in Africa with off-grid solar. Off-grid solar country briefing: Somalia

³⁴ Duflo E (2012) Women Empowerment and Economic Development, Journal of Economic Literature, 50(4), p. 1051–1079

³⁵ UNDP (2012) Somalia Human Development Report 2012

Labour market opportunities for women in Somalia are restricted. The female labour force participation rate in Somalia is 37.3% (% of female population ages 15+) compared to the male labour force participation rate of 75.4% (% of male population ages 15+). Poor labour market outcomes are partly driven by cultural practices, for example early marriage and high fertility rates. Research has shown approximately 45 percent of women aged between 20 and 24 having been married by the age of 18³⁶. A lack of formal education, and low skills among women in Somalia also limits participation in the workforce. However, education alone may not necessarily open doors for women in the labour market. A DRC survey in 2012 found that women over a quarter of female graduates (26.7%) felt that they faced culturally limiting conditions when looking for work, and 33.3% of women felt that biased employment requirements by employers restricted their ability to find employment³⁷.

Figure 14 Distance to frontier score on gender equality in 2012



Even when women are operating in the market – as wage workers or entrepreneurs - it is often in low paid menial positions or running small business in the informal sector. Women tend not to participate in sectors with high profit margins. Social norms, poor education levels and limited access to finance constrain women’s opportunities to flourish in the economy. Women face limited access to finance to a greater extent than men. The Family Law provides equal inheritance right for men and women, however, in practice under both sharia law and social customs, women are typically prevented from inheriting equal shares or any share at all. This limits women’s opportunities in controlling their own finances, and establishing businesses.


Although women are subject to severe inequality and are subject to traditional roles and responsibilities in Somalia, women tend to dominate the informal sector in Somalia, with 60% of businesses in female ownership. But challenges remain, while women dominate the informal sector, an ILO study found that over 62% of female entrepreneurs in Mogadishu felt ‘business related policies were discriminatory against women’. However, there was also little understanding of policies among women surveyed.

An ILO survey³⁸ of women entrepreneurs in Hargeisa and Mogadishu found 47.3% of women had no formal education. Further illustrating the lack of education, 47.7% of women entrepreneurs were unable to read

³⁶ ibid

³⁷ Danish Refugee Council (2012): The Vocational Skills Training. The Danish Refugee council and the Somalia Food Security Cluster.

³⁸ ILO, (Undated) Institutional and Policy Assessment of Factors Affecting Women Entrepreneurs in Micro and Small Enterprises in Hargeisa and Mogadishu



and write. To facilitate women's entry into the labour market, the lack of education among women must be addressed. Although tackling literacy and the provision of basic education may be outside the scope of the proposed training facility, any training must acknowledge the quality of education in Somalia, and tailor manuals and the curriculum accordingly.

Altogether, the severe inequality experienced by women in Somalia will likely have implications for women in attending the training facility and subsequently getting decent work in the renewable energy sector upon graduation. To promote socio-economic inclusion and to level the playing field (see box) will require gender mainstreaming the training facility through policies such as actively recruiting women to attend the training centre, or setting quotas and implementing positive discrimination policies. Fostering gender equality requires adopting a gender-sensitive approach when designing, implementing and running the training facility. As one respondent argues 'typically, [the] issue of gender inclusion is addressed as an add on, [it] is important to address this at the design stage.'

Women in the renewable energy sector

The power sector has traditionally been a male-dominated domain but Somalia's renewable energy sector is in the unique position that skills need to be developed from the ground up. Gender disparities can therefore be minimised from the outset by promoting the inclusion of women in technical and business skills training, while giving due consideration to socio-cultural norms, arrangements and behaviours.

Many stakeholders suggested promoting women's participation in the renewable energy sector would be a significant challenge to overcome. The physical nature of many renewable energy occupations was identified as a one of the barriers preventing women from participating in this sector. One respondent stated "Solar has an important role in attracting women to the sector, and [the training facility] can deliberately train women, however given the Somali context it can be 'pretty awkward' in Somali society to see women climbing ladders and installing panels."

These cultural constraints were echoed in many interviews. However, by contrast other respondents mentioned Somali women carry out physical roles in other sectors such as construction and therefore it is not impossible for women to participate fully in the renewable energy sector. Overall despite diverging views on the difficulty of integrating women in the renewable energy value chain, all respondents agreed that achieving gender equality in renewable energy was important for the sector and for women's economic empowerment.

5. The role of a PPDP in the context of Somalia's emerging renewables sector

To effectively address the socio-techno-economic risks outlined in Section 4, the proposed PPDP needs to move beyond the role of providing technical skills training.

Filling the policy and regulatory vacuum

A policy and regulatory vacuum defines the wider renewable energy sector across Somalia. While Somaliland developed an energy policy in 2010³⁹, Somalia as a whole or within regions is mostly lacking a policy or regulatory framework. During KIs, stakeholders repeatedly mentioned the need to introduce more technical capacity within the Ministries to support the development of appropriate regulation, last but not least to make Somalia more interesting for investors⁴⁰.

In this context, a typical top-down, government-led policy making process (see Box) may not be feasible or even preferable.⁴¹ Instead, the private sector, if

effectively coordinated and managed, can potentially play a relevant role in driving a bottom-up approach to policy and regulatory design as outlined in Figure 15. The proposed PPDP could be the forum to drive this process. By driving the necessary skills development not just “on-the-ground” but also engaging in a wider policy development dialogue with government and providing skilled and knowledgeable experts to this process, some of the necessary frameworks could be developed to support renewable energy deployment. Stakeholders recommended during the interview process that a training facility should also consider the training of future policy makers, not only technicians. Scholarships for post-graduate studies abroad could help remedy this issue.

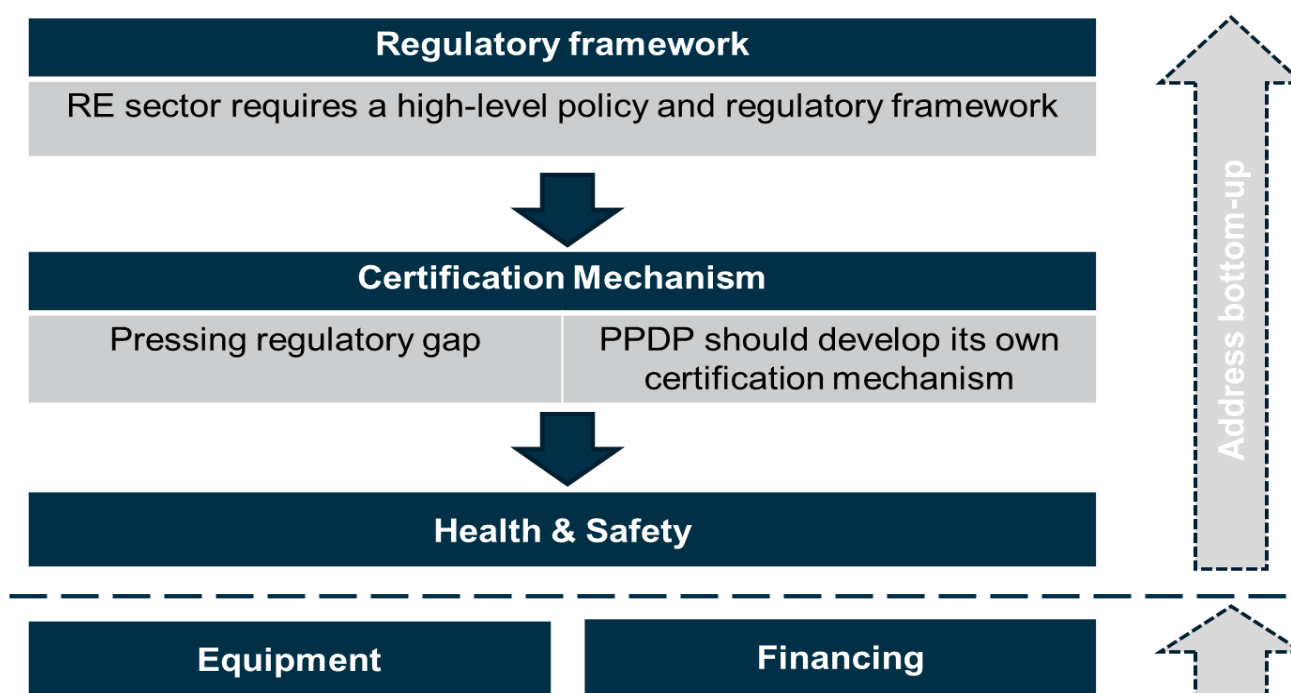
Policy and strategy design: A high-level energy policy should start by defining government ambitions in terms of targets for renewables within the wider energy sector (IRENA, 2015). This process should be transparent and based on prior long-term integrated energy planning (including a Least Cost Power Development Plan). The policy should prioritise key issues (such as addressing the lack of technical skills and the above-mentioned health and safety concerns, but also access to financing and equipment) and outline approaches to remedy these aspects. Based on this policy, a strategy should document pathways to achieve targets and implement regulatory measures (e.g. support for a training centre, certification mechanisms, risk mitigation instruments and reduced import duties for equipment). Institutional capacity building is crucial throughout processes, the design of policy, strategy and regulation. (IISD, 2009)

³⁹ Somaliland Ministry of Mining, Energy and Water Resources, 2010, Somaliland Energy Policy

⁴⁰ Frydas, 2012, The importance of the Regulatory Framework in enabling private sector participation in the Energy Sector, Mott MacDonald

⁴¹ Nakhoda, S. and Ballesteros, A., 2009, Investing in a Sustainable Future: Multilateral Development Banks' Investment in Energy Policy, International Institute for Sustainable Development

Figure 15 Bottom-up approach to policy and regulatory development



Certification mechanisms

Among the regulatory measures most relevant to the proposed training PPDP, a certification mechanism for technical skills is a top priority. Strathmore University’s successful training programme at the Strathmore Energy Research Centre (SERC) in Nairobi was strongly driven by Kenya’s newly established certification requirements⁴² for technicians (see box)⁴³. The need for regulation around certification was echoed by all stakeholders.

Kenya’s certification mechanism for renewable energy technicians


The 2012 Energy (Solar Photovoltaic Systems) Regulation makes it illegal to produce, distribute, supply or install solar energy equipment without a valid license (Kenyan Ministry for Energy, 2012). The licenses are for three tiers: T1 – solar/battery systems up to 100Wp, T2 – medium systems which include an inverter, T3 – grid-connected and hybrid systems. ERC, the Energy Regulatory Commission, interviews applicants and issues licenses. The regulation specifies the required academic qualifications, including completed training courses. The latter need to be accredited under the National Industrial Training authority. Within one year of implementation, the request for licenses had increased to 150 applicants (ERC, 2014).

In the absence of a regulatory framework, and in line with the above-mentioned bottom-up approach, this study recommends that the PPDP should develop its own certification mechanism or work with partners, e.g. from universities, to agree on a common framework. Somali universities are organised within the Association of Somali Universities which is self-regulated and received government endorsement. The Association’s vision is to “collaboration among Somali universities in the areas of research, quality, standards, innovation and development”⁴⁴.

⁴² Kenyan Ministry for Energy (2012) Energy (Solar Photovoltaic Systems) Regulation

⁴³ ERC (2014), Energy News Quarterly, Solar Energy Licenses Growing in Popularity

⁴⁴ Association of Somali Universities profile, <http://asu.org.so/>, accessed 30 November 2016



In this regard, the Association can establish a certification programme amongst all partner institutions, which would include testing and exams that is harmonised across Somalia. The PPDP should offer technical assistance to design this certification scheme. A certification scheme should offer accreditation across the various components of the solar value chain but should also provide basic certification for general electricians. Suggested sources for information on such a certification scheme include the German TÜV Rheinland, the Electronics Technicians Association International, as well as NABCEP, the North American Board of Energy Practitioners, and the Clean Energy Council in Australia. These organisations should have resources that can guide the design of a certification scheme and could potentially provide useful input to certification process development.⁴⁵

⁴⁵ The certifying body should ideally strive to become compliant with the *ISO/IEC 17024:2012 Conformity assessment - General requirements for bodies operating certification of persons*. The standard contains “principles and requirements for a body certifying individuals against specific requirements, and includes the development and maintenance of a certification scheme” (ISO, http://www.iso.org/iso/catalogue_detail?csnumber=52993, accessed 30th November 2016)

6. Reviewing the PPDP concept

As we reviewed the role of a PPDP training facility, the concept itself and its viability to address the above-mentioned challenges should also be assessed.

The PPDP concept and its suitability to bridge technical skills gaps

Public-Private Partnerships (PPPs) are an increasingly popular way of fostering development by drawing on investment and expertise from both the public and private sector. PPPs take various forms and as a result there is no universally agreed definition or model. Typically, PPPs at minimum involve an established contract between a private and public sector actor to provide a public good or service, while jointly assuming the risks and responsibilities^{46, 47}.

In the development context, aid agencies and international NGOs are often involved in PPP partnerships. There is a consensus emerging in development that the government alone is not enough to address development challenges. As a result, the role of the private sector is increasingly viewed as crucial in meeting the challenges of sustainable development⁴⁸. PPPs are viewed as a means of addressing market failures, particularly in an environment of limited fiscal space and little government capacity^{49, 50}.

However, the PPP concept has attracted some criticism. It is not yet clear to critics whether PPPs are the right tool to achieve development objectives, with a number of failed PPPs raising questions on their efficacy⁵¹. PPPs have come under fire over costs with PPPs at times costing more than other approaches. For example, a study in France on public services delivered by the private sector through PPPs, found that in 2004, after making allowance for all other factors, the price of water under PPPs is almost 17 per cent higher than in places where municipalities provide the service. In addition, critics point out that quality and efficiency of service provision is not always realised, and co-financing isn't always met as agreed with the private sector⁵².

Sida's experience establishing training centres: Sida has established several partnerships with the private sector and implementing partners to create training facilities, including Ethiopia, Zambia and Iraq.

An independent evaluation of the PPDP training facility established in Iraq found that the training academy lowered unemployment by 24% relative to the 'pre-training situation'. The evaluation also found that the training academy 'raised the quality of training offered and former students praise the quality of training offered'. The evaluation concluded that the Swedish training facility in Iraq has shown that private actors can make a 'meaningful contribution' towards skills training. The evaluation also highlighted challenges related to the continued vocational training of mechanics. The training centre relied on public funds from the public sector, but these funds were not guaranteed, putting the facility at risk of bankruptcy. (UNIDO, 2015b)

⁴⁶ Ministry of Foreign Affairs, The Netherlands (2013) Public-Private Partnerships in developing countries: A systematic literature review

⁴⁷ World Bank (2015) Introduction to Public-Private Partnerships

⁴⁸ DFID (2014) Operational plan 2011-2016 Private Sector Department, AfDB (2013) Supporting the Transformation of the Private Sector in Africa Private Sector Development Strategy, 2013-2017

⁴⁹ AfDB <http://www.afdb.org/en/topics-and-sectors/sectors/private-sector/areas-of-focus/public-private-partnerships/>

⁵⁰ World Bank (2015) Introduction to Public-Private Partnerships

⁵¹ KS et al (2016) Public-Private Partnerships and the 2030 Agenda for Sustainable Development: Fit for purpose?, DESA Working Paper no. 148, Euro dad, Public Private Partnerships: Fit for development?, PSIRU (2015) Why Public-Private Partnerships don't work

⁵² *ibid*

Difference between PPPs and PPDPs

Public Private Development Partnerships (PPDP), although similar to some extent, differ from traditional PPP arrangements. Similar to PPPs, costs are shared and expertise is drawn from all actors⁵³. Again, definitions of PPDPs vary among donor agencies⁵⁴, but overall, a PPDP is viewed as a joint venture between a private sector and public sector actor with a clear objective to achieve a development goal^{55,56}. By contrast PPPs tend to focus on infrastructure projects and do not have to have an explicitly pro-poor objective.

Most importantly in a PPDP, the private sector is not only expected to co-finance projects, but to take a leading role in the initiative⁵⁷. This is consistent with the approach advocated by many stakeholders interviewed for this study - as one respondent stated *'Overall, with any training initiative, it is important to ensure it is private sector driven. This is important because the skills training centre should translate into jobs.'*

Although PPDPs focused on training can be successful in narrowing the skills gap, there are some risks associated with this approach. Sida's PPDPs usually expect that the private sector will cover at minimum half of the costs of a PPDP venture, in financial contributions or in-kind. As a consequence, there is a risk of bias toward the private sector partner's needs: PPDPs focused on skills training can disproportionately benefit the needs of firms closely engaged in the PPDP, instead of narrowing the overall skills gap in the targeted sector⁵⁸. This can be minimised if the training curriculum is broad enough that skills can be applied to any firm in the sector and input from additional "consulting" partners from the private sector is sought.

Other challenges include long-term financing of PPDPs (see box for a brief overview of Sida's PPDP in Iraq and other countries). A desk based study reviewing Sida's experience from private sector partnerships argues that 'PPDPs which depend upon public finance to sustain the outcomes and/or impacts of the partnership carry a higher risk than other partnerships. Such risks should be taken into account at an early stage of partnership formation.'⁵⁹ As a result, it is prudent to plan for financing options beyond public funds and donor support, preferably over the long run, while the training facility should aim to become self-sustaining overtime.

⁵³UNIDO (2015a) Independent mid-term evaluation of UNIDO project Learning and Knowledge Development Facility (LKDF): a Sida-UNIDO industrial skills development resource

⁵⁴ For example the Swiss Agency for Development and Cooperation (SDC) adopts a broader definition of PPDPs, while Sida is more explicit in its approach. *TKmore detail* <https://www.news.admin.ch/newsd/NSBExterneStudien/337/attachment/en/1247.pdf>

⁵⁵ Tamutzer A, and Schafer J (2006) SDC's Cooperation with the Private Sector: Brief Analysis and recommendations. Bern: Swiss Agency for Development;

⁵⁶ https://www.unido.org/fileadmin/user_media_upgrade/Resources/Evaluation/TEGLO12033-LKDF-2014.pdf

⁵⁷ *ibid*

⁵⁸ de Silva et al (2015) Now Open for Business: Joint Development Initiatives between the Private and Public Sectors in Development Cooperation, EBA

⁵⁹ Söderbäck M (2016) Desk Study of Sida's Experience from Private Sector Collaboration

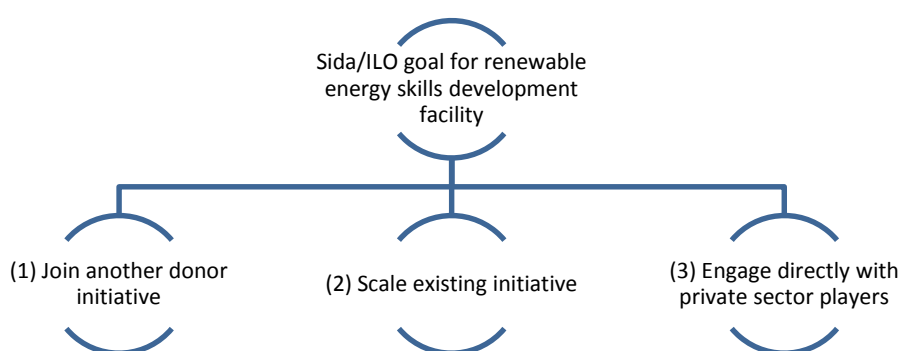
7. Stakeholder mapping

Samuel Hall interviewed 35 key informants for this study, including 12 private sector representatives from Somalia and the wider region. We established contact with the Ministry of Energy in Somaliland and identified relevant contacts within the Ministry of Energy. Relevant contact details are provided in Annex II for future engagement.


Options for PPDP implementation

Training initiatives for renewable energy skills development in Somalia already exist or are under discussion. From the conversations with donors and the private sector, we identified several options (see Figure 16) for Sida and the ILO to develop this facility in collaboration with existing or planned initiative and bring them in line with the purposes of the PPDP model.

Figure 16 Options for PPDP implementation



- (1) Sida can collaborate with other donors or organisations who are in discussions with other stakeholders and drive a private sector component in these initiatives that is aligned with the objectives of the PPDP. UNDP, USAid and Shuraako all have plans to engage in a training facility but it should be noted that none of these initiative have confirmed financing.
- (2) Sida can support the formalisation and scaling of existing training initiatives with a strong private partner component such as the one run by NRC and GIZ in Kismayo with SolarGen. The ILO is furthermore working with City University and SolarGen on a solar training programme.
- (3) As a third option, Sida could consider engaging with other private sector players such as Golis Energy or Kaafi Solar who are also well established players and active in promoting skills development. Two initiatives are of interest:
 - Golis Energy in Garoowe, Puntland is in advanced stages of developing a training facility with funding from USAid. The facility's purpose is to train in-house staff but could be expanded and formalised as a training centre.
 - Kaafi Solar is member of a Somaliland steering committee which is considering a training programme at a vocational training centre in Burao. The facility is not yet operational either but regional government institutions (Ministries of Energy and Education) are interested in leading this facility in collaboration with a private sector partner.



Out of the three initiatives, the SolarGen/City University programme lends itself as a suitable initiative that can be built upon. The training programme is straightforward to integrate into the proposed curriculum for this facility as it is focused on business skills for solar lighting and can cover the non-technical training stream suggested in Section 8 below. The dialogue between the two partners as well as the ILO is ongoing, functioning and can be formalised to include other stakeholders required in the PPDP. The existing, proven collaboration between the three parties also reduces project risk.

Coordination process and main stakeholders

Coordination with other donors and the public sector

The proposed PPDP should coordinate with other donors on their plans and initiatives. A donor steering committee for renewable energy skills training in Somalia could help with this coordination process and drive important synergies and efficiencies in addressing this issue. The coordination process should have a regional outreach component that involves the public and private sector at regional level.

Donor coordination

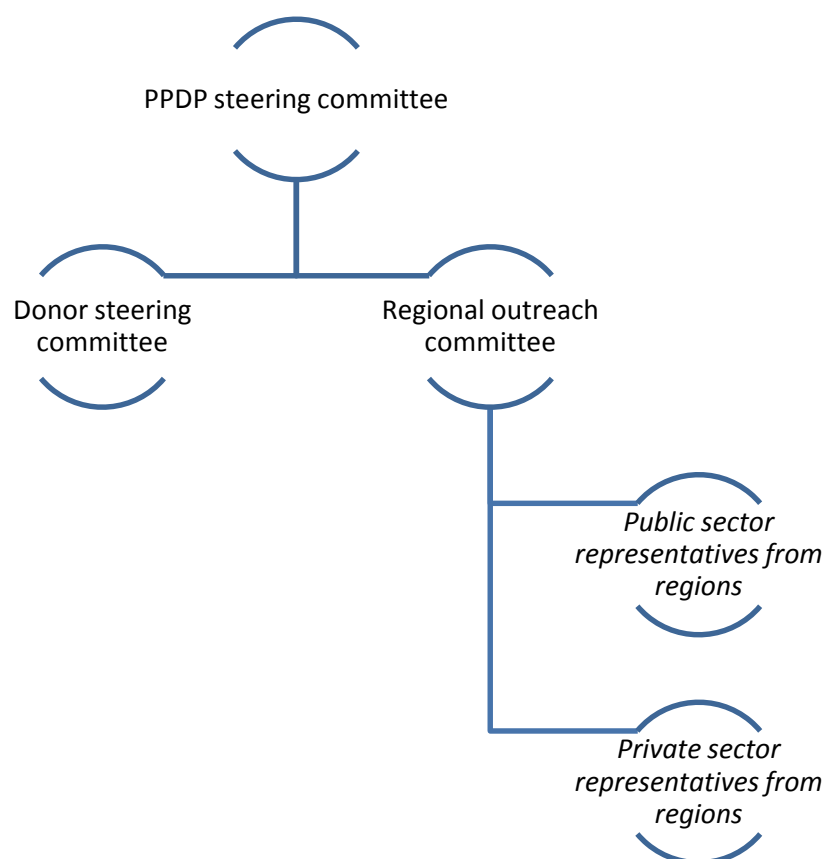
The training facility has the opportunity to move beyond mere skills training provision and play a greater role in the promotion of renewable energy technologies across Somalia. Without coordination across different training initiatives, inconsistencies across curricula can complicate the development of joint policies and mechanisms, such as a joint certification process.

In terms of donor coordination, it should also be noted that the AfDB is including a technical training facility for infrastructure development in their budget for the next five years. AfDB is looking to get approval for \$5 million funding in 2018-19 and possibly an extra \$5 million for follow-up work. The possibility of engaging with Sida's PPDP at scale-up stage and to expand it into other infrastructure sectors is very welcome.

Public sector and regional coordination

It is important to ensure buy-in from, and inclusion of, the public sector from an early stage. This should not exclude representatives from other regions and administrations within Somalia. Depending on needs (e.g. for awareness raising campaigns), state and district level representatives may need to be involved or consulted with, too. For example, if the facility is based in Mogadishu, representatives from Somaliland and Puntland should be members of the steering committee. The overall PPDP steering committee can have a sub-committee for this purpose which includes regional representatives and is led by the ILO.

Figure 17 PPDP steering committees



Interaction with the private sector

The establishment of the facility should be a co-creation process between public and private actors. Although donors are key stakeholders in the establishment of the skills PPDP facility, it is the private sector that is the most important actor. This is particularly relevant in Somalia, where the private sector runs the energy sector with little to no government involvement. Therefore, as many stakeholders emphasised, to ensure the sustainability of the training facility, and to ensure that the skills training translates into jobs it is crucial that the training facility is led by an interested private sector.

The roles of the public and private sector should complement each other:

- The private sector's main responsibility should be to provide market information, identify renewable market needs and provide in-kind contributions, including curriculum development. The private sector partner will also be able to source equipment at a better rate and potentially provide it at cost price.
- The role of the donor is to address development goals by providing financing to set up the facility, ensuring that the curriculum addresses gender diversity, offer support to qualifying students unable to afford the full tuition and monitoring the implementation process.

The liaison partner can enable this collaboration by bringing both partners and their respective roles together and coordinate.

Equally critical in this process is to ensure donor involvement and input is sustainable and has a clear exit strategy. A lot of initiatives start with donor money, however once funding runs dry often these initiatives fail to operate independently of this funding. (The completion of Golis Energy's training workshop is delayed

due to a shortage in funding after the first donor grant.) To mitigate this, it is crucial for the training centre to be private sector led, with the initial support of donors but with a donor exit strategy in place.

Suitable private sector partners

As a private sector partner, SolarGen stands out due to their prior experience in collaborating on training initiatives, as well as their clear commitment to narrowing the skills gap in renewable energy. It makes sense to build on these existing relationships and develop them further. In addition, SolarGen has a broad-based off-grid technology portfolio and operates across Somalia and East African markets, rather than just regional.

In addition to the core partners, several consulting partners have offered input on the curriculum as well as possible internships, notably

- Seccco, a solar developer based in Puntland, has two equipped workshops available and already provides semi-formal training to their own staff
- Sollatek, a distributor of solar and power control equipment, has several workshops across East Africa with existing formalised internship programmes that can be made available to students and recent graduates – however, they would train students on their full range of products, not just solar
- BECO, the Mogadishu based IPP, is interested in a training facility and would be supportive but they require more information for further engagement.
- Kaafi Solar and Golis Energy are both highly interested in a training programme and would appreciate a training centre in Puntland or Somaliland
- PowerGen Renewables, a Kenyan microgrid developer can provide feedback on curriculum design as they are in the process of developing their own in-house training
- Telesoms, the Somali telecoms provider is interested in the initiative but would need to clear any involvement at Board level

The Strathmore Energy Research Centre based at Strathmore University in Nairobi can be drawn in to support the facility for curriculum design, and more complex training components around grid-tied systems. An opportunity may exist around sourcing equipment jointly to reduce costs.

It should be noted that SolarGen, Golis Energy, Seccco and BECO were recommended as private partners on several occasions by different donors.

Awareness raising

Driving demand for projects outside donor-funded work is important, especially in the offgrid space for the purpose of rural electrification. Donors should not be the main source of financing for renewable energy projects, but projects should meet demand from consumers. It is easy to oversize ambitions for renewable energy roll-out with a lack of understanding on a country's power demand.

In order to drive demand from consumers for renewable energy installations, especially for offgrid systems, awareness raising campaigns will be necessary. The training facility should receive some funding to support such an awareness raising campaign which should be run in close collaboration with the local authorities where possible. A pilot campaign could be run in Year 1.

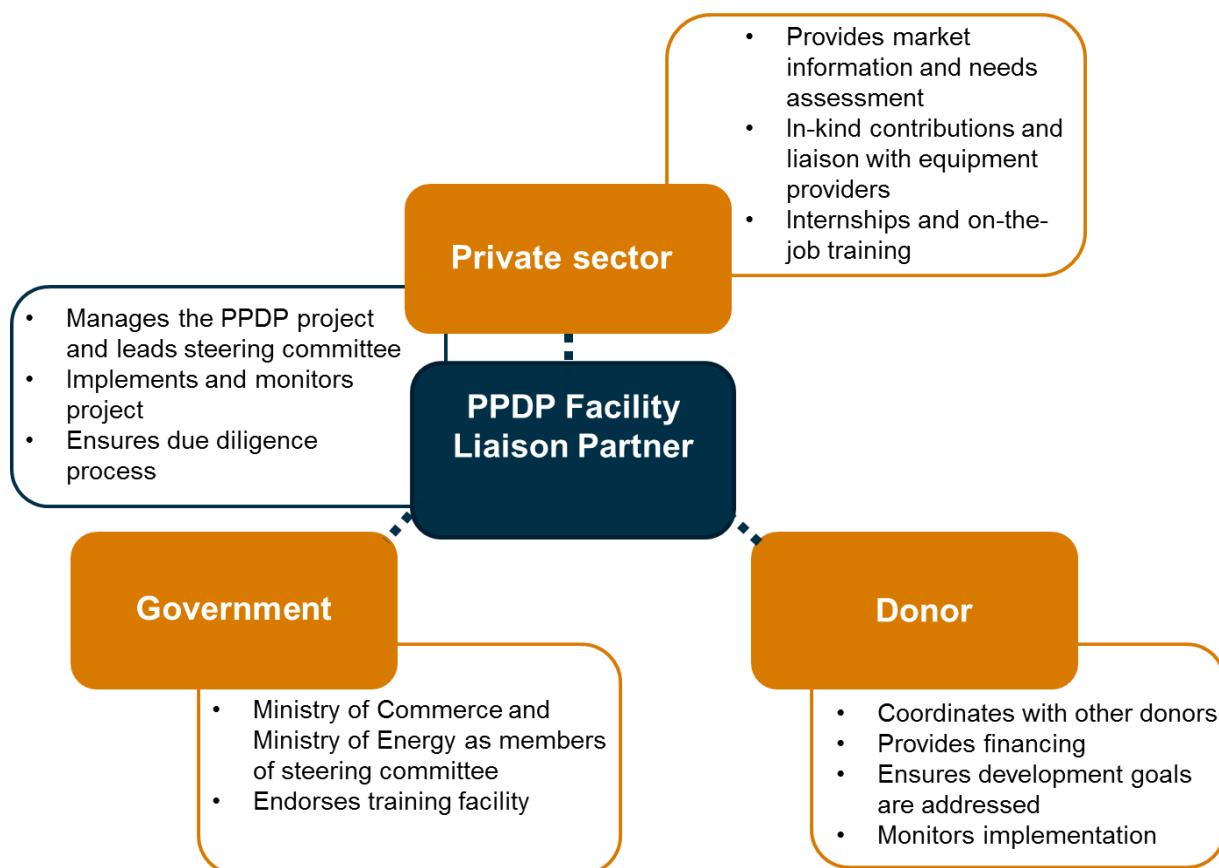
8. Draft PPDP Design

The following outlines the structure of a PPDP for renewable energy skills training in Somalia. It provides details on the governance structure, location and student recruitment, teaching model and proposed curriculum. It also outlines a microfinance component as part of the PPDP facility.

Governance structure

Establishing the correct governance structure of the PPDP facility is crucial in ensuring the success of the PPDP facility. Roles and responsibilities of each key actor should be outlined clearly in relevant documentation and Memoranda of Understanding (or Agreement, see box). Additionally, the objectives of the PPDP facility should be clearly communicated to all stakeholders, including those directly involved and the above-mentioned consulting partners.

Figure 18 PPDP Governance structure



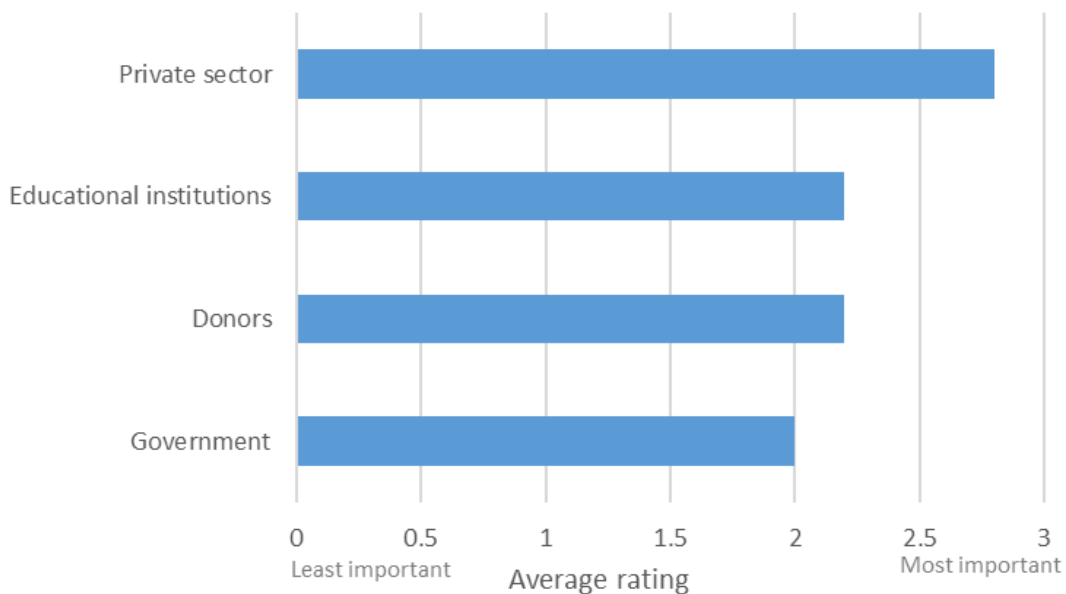
Role of the government and public sector

Given the current political context, stakeholders overwhelmingly agreed that the government of Somalia does not have the current capacity to have an active role in the establishment of the facility. However, the government should be consulted and involved as part of the steering committee, with the Ministry of Commerce as well as the Ministry of Education and Ministry of Energy as partners of the facility. The involvement needs to ensure endorsement of the programme.

It was pointed out that hosting the facility in a university will help with this process as universities typically enjoy the endorsement of the government. Due to their existing relationships with government, establishing the centre within a university would engage the government without requiring active involvement. Within the survey conducted by Samuel Hall, the government was listed as the less important actor by respondents.

Memorandum of Understanding vs. Memorandum of Agreement: For a PPDP, key project partners will typically sign an MoU which outlines the necessary joint objectives by the parties and expected inputs from each side. SARETEC, a training facility in South Africa, pointed out that signing a Memorandum of Agreement (MoA) can be of greater benefit to the private sector player as well as the training facility as it includes a number of hard agreements and clauses to which both partners commit to.

Figure 19 Survey question - Who are the key actors in establishing a renewable energy training facility?



Source: Samuel Hall, Somali private sector energy companies

Role of the liaison partner

The role of the liaison partner is to manage the PPDP project including the financial contribution to the facility, and to implement and monitor the project. The liaison should also ensure that due diligence for all partners takes place with regard to human rights, environment and gender equality are addressed throughout the implementation of the facility, and is in line with Sida's due diligence process.

Based on Sida’s experience of establishing PPDP facilities it is crucial for the liaison partner to be flexible, identify the different strengths of key actors and to work step by step with all stakeholders in the implementation of the facility.

The ILO, due to its existing involvement in the City University/SolarGen initiative and relations within Somalia, lends itself to leading this role. The ILO would be a broker of relationships in this facility, driving engagement across all partners and connecting them effectively.

The Somali Chamber of Commerce and Industry has furthermore expressed an interest in engaging with the training facility. Should the project go ahead they would want to negotiate the extent of their engagement in the facility, but provisionally they have offered in kind assistance in the form of furniture and infrastructure (physical space to host the institution). Additionally, given their network of business members they would also be able to assist in providing employment opportunities to students upon graduation.

Engagement

Engagement with the facility refers is determined by the choice of location, and the way that students are recruited.

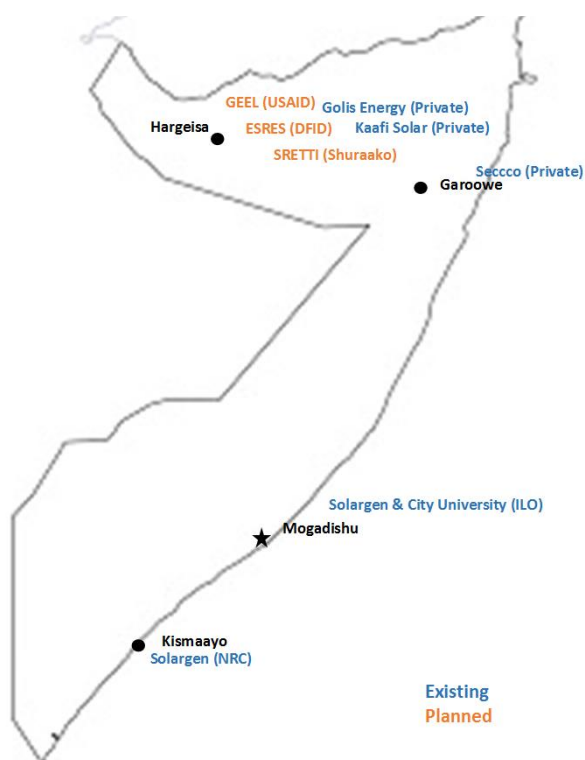
Location

Preferences for the location to establish the training facility varied among respondents, largely influenced by existing business interests. Concerns were raised about security and cost concerns if the facility were to be based in Mogadishu. These concerns came primarily from regional players in Somaliland and Puntland as well as external players looking to invest in Somalia.

Most stakeholders agreed that some form of regional outreach of any new facility would be important. For example, an initiative based in Mogadishu could draw on contacts with the Association of Universities and local private sector partners to develop additional institutes in Puntland and Somaliland. In order to ensure regional outreach, regional partners should be included early on.

It should be noted that focusing on Mogadishu as a location could make the PPDP complementary to initiatives already ongoing or under development at regional level (see Figure 20 Renewable energy skills training initiatives across Somalia). Presently, the initiatives between SolarGen and donors in Mogadishu and Kismaayo are the only programmes in South Central. The above-mentioned donor steering committee with a sub-committee focused on regional outreach would be crucial to guide and coordinate this process.

Figure 20 Renewable energy skills training initiatives across Somalia



Student recruitment

A comprehensive and targeted approach to student recruitment will be an important element for success of the proposed facility. To this end, the PPDP should from the outset develop a database, the liaison partner in collaboration with actors such as the Chamber of Commerce and Industry, to identify individuals who are interested in pursuing the proposed technical training. This can include existing electricians and technicians and graduate engineers, as well as individuals interested in pursuing this career path.

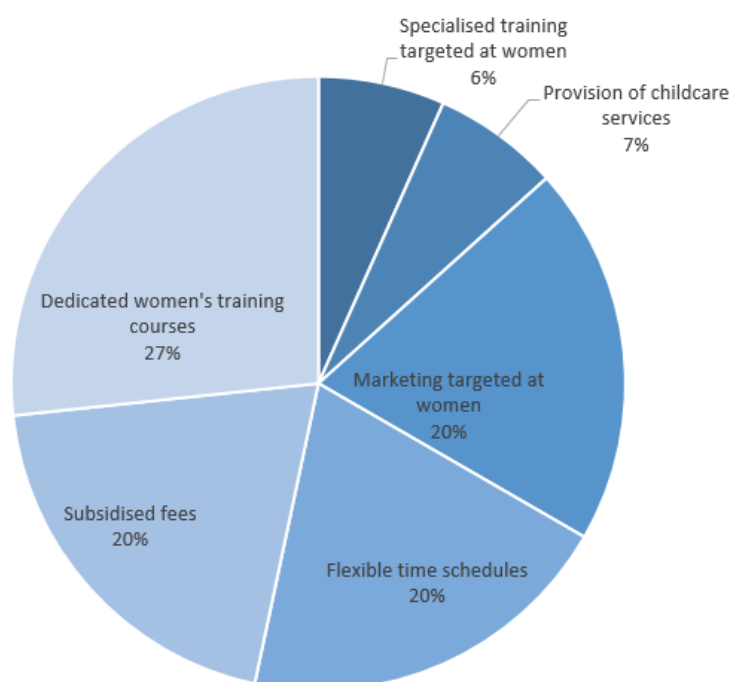
In addition to student recruitment, the database will also serve as an outreach platform for the PPDP to source possible employment opportunities for graduates and maintain interest in the training centre. The database should draw on and include all private sector businesses active in the power sector in Somalia and also reach out to other actors in East Africa. It needs to include several gender diversity-focused organisations such as the Women Entrepreneurs Association and Women in Renewable Energy Somalia. Social media should be drawn upon to support further awareness raising and public information.

Attracting female students

To promote women's participation in the proposed training, the curriculum should be adapted to be more gender inclusive.

- To promote at least 50% women participation in renewable energy will require actively recruiting women onto the training programme. The database developed as part of the student recruitment effort could also serve as an outreach platform for the PPDP to identify prospective female students from industry, TVET courses and universities. The database would include several gender diversity-focused organisations such as the Women Entrepreneurs Association and Women in Renewable Energy Somalia.
- To encourage greater participation, the training facility could furthermore offer women only training programmes as well as subsidised course fees for women (this would also help to overcome the initial financial constraints to entering the training programme). To address low female participation in their programmes, SERC in Kenya recently offered a donor-sponsored women only training. The training offered was provided to female students at no charge, and resulted in oversubscription to the course. However, some stakeholders highlighted that there may be little interest among Somali women for this type of training. Therefore, awareness raising is an important element and needs to be taken into account during the design of the student recruitment process.
- Short of developing women-only programmes, the basic technical curriculum could be topped up with specialised courses focused on non-technical skills that will allow women to make an informed choice about which specialisation they want to take. This approach speaks to the dominance of Somali women in the local economy. Similar programmes have been established in Bangladesh. As part of the Green Jobs in Asia project, women in Bangladesh were trained as solar technicians or solar entrepreneurs as a means of promoting renewables and also providing employment opportunities to unemployed and underemployed women.

Figure 21 Survey question - What is the best way to encourage women's participation in training?



Source: Samuel Hall, Somali private sector energy companies

Teaching models

It is essential to move away from pure theory- and classroom-based training for electricians, technicians as well as university graduate engineers. While classroom-based teaching is the most affordable form of education, practical and on the job training has to be an essential component of the programme to ensure that students are well trained and can contribute to the improvement of Somalia's power sector. Skills training already takes place in Somalia. However, it is done primarily internally, through ad hoc and on-the-job training for upcoming projects. Private sector players have their own workshops but not all are equipped for formalised training.

A formalised technical skills training programme should not lose this practical component and be an integral part in any training programme. Feedback from Strathmore has been that trained graduates find it hard to be hired unless they have some on-the-job experience. Having a pool of private sector partners who can train on-the-job following or in combination with more formal training would be useful to ensure employment for graduates.

Training of Trainers

Training of trainers will also need to take place at the facility on a needs basis. If a ToT programme cannot easily be run from within the facility from the outset, then placements abroad should be considered. It may be more cost-effective to send candidate trainers to e.g. Nairobi or elsewhere to be trained, rather than sending external trainers into Somalia to deliver ToT programmes. ToT programmes should not be a one-off initiative but encourage ongoing learning to ensure fresh skills are brought into the country.

STRATHMORE UNIVERSITY SERC

In the initial set-up of its curriculum, SERC followed the tier categories as outlined in the regulation for solar photovoltaics systems from 2012, for licensing technicians. However, they have now grouped tier 1 (small-scale offgrid solar <100Wp) and tier 2 (medium-sized solar systems that include an inverter) into one training programme and split tier 3 (larger grid-tied installations) into two sub-programmes: hybrid and solar grid-tied systems. Hybrid systems refer to a system relying on both a solar panel, diesel generator and/or battery.

SERC essentially offers a certification programme for students who have prior technical understanding and knowledge. The curriculum provides the necessary skills and understanding in programmes lasting between 2 to 4 weeks with tier 1 and 2 50/50 classroom and workshop based, and tier 3 training requiring more classroom teaching (65/35). The programme also offers e-learning which can be accessed online via a desktop or mobile phone. The e-learning system allows for the provision of content ahead of the course and enables students to pursue their day jobs while training for new qualifications.

The programme runs 12 training courses per year for tier 1&2 and tier 3, with each course having around 15 students. SERC employs three permanent trainers and has three ToT students who undertake a more intense version of the tier 1-3 courses. Some ToTs are sent abroad for further training, e.g. to India.

The programme benefited from the expertise of a technical expert seconded to the project for the long-term. This technical expert had prior experience developing training centres and is an expert across a range of solar technologies. He helped build and grow the SERC facility and is partly paid for by Strathmore University and the GIZ.

Scholarships and twinning

In addition to vocational training and ToT programmes, scholarships have been mentioned for engineering graduates to undertake post-graduate training abroad. Scholarships should be tied to a commitment to provide ToT and technical capacity building within government institutions.

An alternative (or complimentary) model to scholarships would be twinning programmes between the larger IPP players and a utility abroad, e.g. KenGen or Middle Eastern utilities (e.g. Oman). Such a programme would imply an exchange of utility staff, rather than students, but could be linked to the training facility for a ToT programme at a later stage of the curriculum development. Such a twinning programme could last 2 years with two exchanges of 6 months.

Training Design

Skills development: Skills development refers to “the acquisition of practical competencies, know-how and attitudes necessary to perform a trade or occupation in the labour market”. To maximise benefits, skills development is best done within the context of the wider sector it addresses. For renewable energy, this means skills need to be integrated into the needs of the wider energy sector rather than promoted in isolation.

The technology focus of the facility influences the curriculum. That said, the general agreement among stakeholders was that many of the skills that would be acquired in basic training will be applicable for all technologies and can then be built upon toward supporting more complex projects.

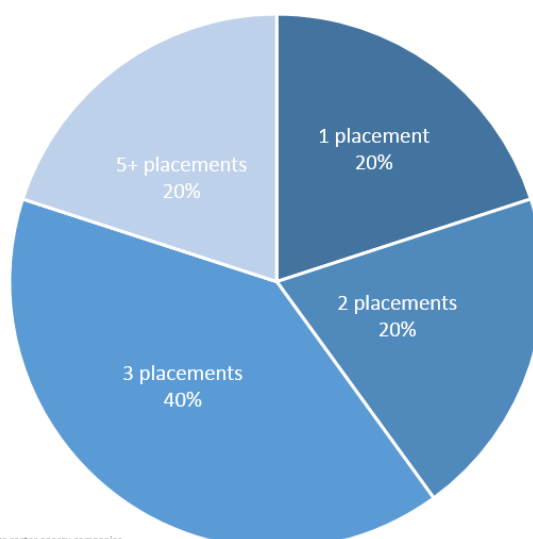
SERC (see Box for details) provides some helpful insights into developing a curriculum, but a training centre in Somalia would probably require greater basic technical skills training in addition to the specialisation training provided at SERC. It has to be assumed that at least a refresher course or comprehensive basic training on electrical engineering principles prior to the full curriculum will be required for most students to ensure they are all on the same level.

Programme length and size

Respondents stated that training time on-the-job varies depending on prior technical knowledge, but a basic technical training can probably be provided within 3 to 6 months through classroom and workshop teaching; plus 3-6 months for on-the-job training, leading to a 6 to 12 month programme.

It is important to ensure sufficient practical experience before certification is granted by the university. Certification should take place following a standardised theoretical test and completion of a practical assignment in the facility’s workshop. Proof of a completed internship should also be provided. All survey respondents were able to offer an internship but their ability to offer several placements within one year varied (see Figure 22). The internships should be supervised by the training facility and the structure of the placement should be agreed upfront between the private sector player and the training facility.

Figure 22 Survey question - How many placements would you be able to offer per year?



Source: Samuel Hall, Somali private sector energy companies

There may need to be some part-time element to the course and workshop component of the programme as students may need to continue a day job during their studies and will require flexibility for the training schedule.

When starting the training programme it is important to start with a small number of students so that the market can absorb them. Typical course sizes at SERC have around 15 students. This could be a good number for the pilot programme. Depending on employment of these graduates, courses can start running in parallel after 6 to 12 months, but should always be need-based as to not flood the market.

Proposals for course syllabus

Training needs to cover the value chain for offgrid systems. This includes the following:

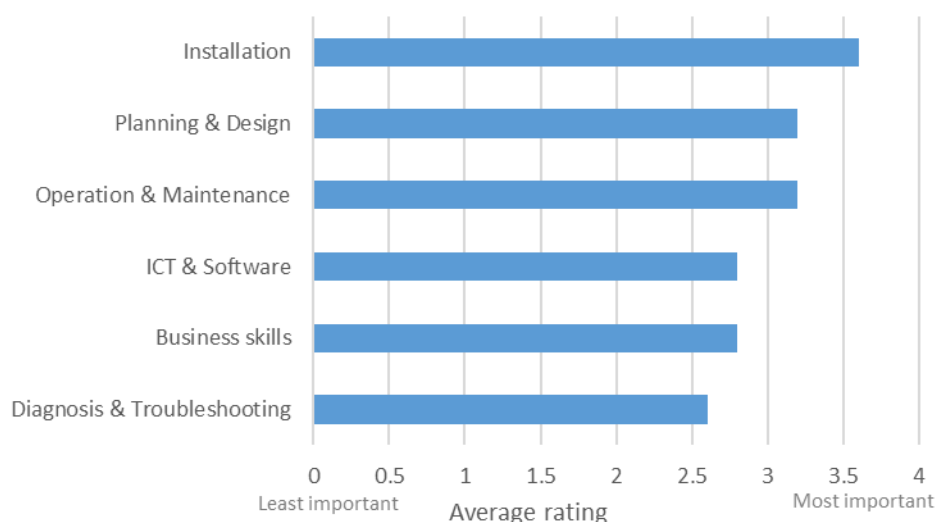
- Planning & design
- Installation
- O&M
- Diagnosis & Troubleshooting
- ICT for pay-go systems
- Reporting
- Business skills

In addition, grid-tied systems require the following technical skills:

- Planning & design for grid systems
- System operation software

The survey revealed that all elements are important to the private sector respondents, but installation, planning & design and operation & maintenance featured most strongly in the responses (see Figure 23).

Figure 23 Survey question - What are the key renewable energy skills required in Somalia?



Source: Samuel Hall, Somali private sector energy companies

In terms of technology focus, the technical training should teach basic electrical skills, wiring of systems in buildings, solar PV for power generation, basic hydraulics for water pumping systems, microgrids, diesel generators and batteries.

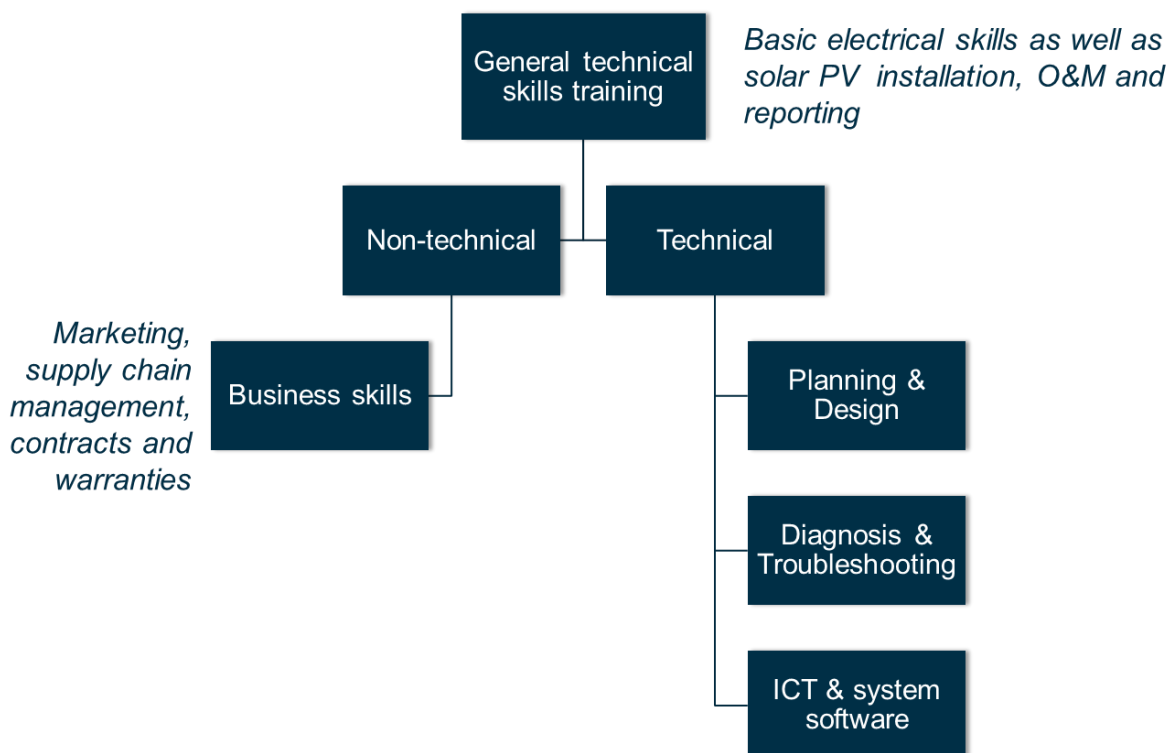
Curriculum structure

It will be useful to build the programme up from basic to more complex tasks. All respondents suggested that installation and O&M are tasks that are straightforward to train. Training on diagnosis and troubleshooting, ICT and planning and design of systems will take additional focused training. One highlighted requirement was training on reporting, especially for more complex grid-tied installations as keeping track of installation and O&M data is essential to later support any issues and repairs.


In order to create a diverse set of graduates, also in terms of encouraging women to join the programme as outlined above, it will be good to split the curriculum (see Figure 24): after a general technical skills training focused on installation and O&M the option to choose a technical and non-technical specialisation should be offered.

- The technical specialisation would focus on the abovementioned more technical training components in the offgrid space for diagnosis and troubleshooting, ICT and planning and design of systems for those students that show an interest and aptitude to progress to more complex tasks.
- The non-technical specialisation would focus on business skills, including supply chain management, distribution, marketing, contractual agreements, incl. warranties.

Figure 24 Proposed curriculum structure



During the initial set-up of the facility, it makes sense to send students who would like to focus on grid-tied systems abroad for training, e.g. to SERC in Nairobi. Exchanges with Indian institutions may also be an option. SERC has expressed interest in welcoming students to their facility. An agreement would need to be reached on accommodating the tuition, travel and accommodation fees for students in the financing budget for the facility.



The training facility can be an important place for not just teaching technical and business skills, but also general life skills. Emphasis should be placed throughout the whole curriculum on teaching and maintaining workplace etiquette such as time keeping and attendance, but the curriculum should also offer sufficient flexibility to accommodate the needs especially of women who may be tied into other social responsibilities, as well as those students who will need or want to carry on a day job throughout the training course.

Graduate employment

The emphasis on a practical training component through internships in the private sector will greatly improve the employability of graduates from the proposed training facility. Connections to future employers will have already been formed during training and a well-designed database will facilitate the job search for students. Special attention, however, needs to be paid to the employment of women.

Ensuring employment for graduates


Most importantly, what is needed is to achieve gender equality in participation at the training facility is a commitment from all stakeholders to challenge and address any biases, policies, or other difficulties facing women from entering this sector. Women should represent 50% of the student cohort in at least 5 years from the establishment of the training facility. To this end, all stakeholders should be committed to achieving this target and it should be incorporated as a core objective in any agreements signed between stakeholders. This commitment will help to ensure women gain equal representation in the RE sector, working towards more sustainable and equitable growth.

Over the long run policies and initiatives should strive to ensure equal participation in all areas of renewable energy including technical roles. One option for example could be implementing special programmes and quotas employing women for non-traditional jobs. Women are considered an asset: several private sector stakeholders stated that they consider female employees more honest and dedicated to their jobs. Programmes could build on this perception and should be developed in partnership with industry partners and women's business associations.

Working capital and microfinance

Many stakeholders highlighted the lack of finance as a key constraint facing the renewable energy sector. If access to finance (i.e. working capital) is not adequately addressed, entrepreneurship skills training will not be sufficient to promote entrepreneurial job opportunities. Incorporating a microfinance facility and marketing this offer to women as part of the PPDP would help ensure resilient outcomes for female graduates.

To ensure resilient outcomes for graduates wishing to establish their own renewable energy business the training facility could offer access to finance similar to the Green Jobs in Asia Project in Bangladesh. In 2011, a public-private initiative with Grameen Shakti, the largest private service provider of rural-based renewable energy in Bangladesh and the Bureau of Manpower Employment and Training, a public sector training provider, developed an entrepreneurship training module which provided skills training, access to finance and a contract with Grameen Shakti as suppliers or contractors.



Using the same model, the training facility in Somalia could work with existing microfinancing institutions and distributors to design an entrepreneurship package offered to graduates from the non-technical model consisting of access to a solar loan and a contract with distributors to provide stock.

A similar offer is currently being developed in Somalia. ILO, SolarGen and the International Bank of Somalia are in the process of designing a loan fund which would include training of roughly 60 people in business skills to engage in solar systems distribution. The training facility could learn from this model, and build on this existing initiative.

Two other key stakeholders, KIMS a subsidiary of KAAH and Micro Dahab a subsidiary of Dahabshil, both with branches across Somalia and Somaliland have also expressed an interest in partnering with the training facility to design and offer a specific loan for graduates. KIMS is the largest microfinancing institution in Somalia with 9 branches, while Micro Dahab, established in 2014, offers loans with the objective of poverty alleviation, as well as women's empowerment.

Both KIMS and Micro Dahab operate as private companies with strict compliance and procedures in place. These companies already operate in Somalia and therefore have expertise in offering loans to low income and but economically viable clients, and crucially have an understanding of the Somali financial sector with little to no regulatory framework. This experience is key in setting up a sustainable and feasible offer in Somalia. Additionally, both companies have programmes offering small solar products, and therefore could also facilitate identifying the right distribution partners.

However, there are a number of challenges in running such a scheme at the PPDP facility. A significant challenge in Somalia is the absence of a robust financial sector and lack of regulatory framework. As a result, there is significant risk associated with providing this type of microfinancing.

Other key considerations when establishing the solar entrepreneurship package is designing the right loan product and ensuring clients are aware of the terms of loan product. This will prevent defaults and enable clients to make full use of the package to successfully run their own business. Previous microfinance initiatives have failed due to misperception of the loan product offered. To mitigate against this, the skills training offered should incorporate training on financing which could be developed and delivered in collaboration with the microfinance institutions.

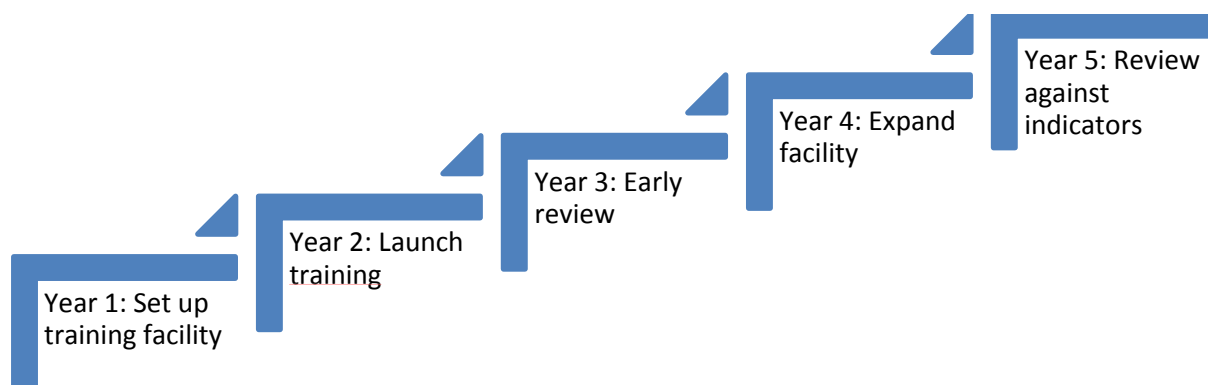
Different business models such as pay-as-you-go payment mechanisms could help to some extent in alleviating some pressure to provide upfront capital. But very few suppliers will provide equipment for free upfront to a new and untested distributor under the assumption that they will be repaid in instalments as the distributors sell the products. An alternative approach may be for donors to provide an initial stock of e.g. solar lanterns for free to initiate the market. This is an option to be evaluated carefully as it risks adversely affecting the market for existing private suppliers.

9. PPDP Implementation Roadmap

Timeframe

Depending on the ambitions for this facility and the appetite of donors to continue involvement to scale the facility across Somalia, the PPDP from inception to full operation and expansion could lie between 3 to 5 years.

Figure 25 Implementation roadmap



Year 1:

- Set up facility (administrative procedures, design curriculum, furnish teaching space/lab, source equipment, hire staff, etc.)
- Sign MoUs with partners
- Develop microfinance facility
- Produce and implement marketing strategy, run awareness campaign
- Initiate steering committee to develop relations with government and other institutions (to design certification scheme)

Year 2:

- Bring ToT and first student training programme underway
- Send students to SERC for tier 3 grid systems training
- Initiate regional outreach via steering committee to consider replication in other regions
- Intensify engagement with government on formulating policies and regulatory frameworks

Year 3:

- Early review of success against indicators
- Consider scaling curriculum to tier 3 if demand in-country is sufficient
- Consider developing one or two training centres in other regions

Year 4:

- Start training at additional centre(s)
- Expand curriculum and R&D activities
- Consider scaling and replication via AfDB initiative

Year 5:

- Full M&E review of training facility

Budget

The provisional budget for the facility is estimated at a total of around US\$850,000 for Year 1, and US\$500,000 to 550,000 for Year 2 and 3. The estimated budget is based on a desk based review of existing training facility budgets, and key stakeholder interviews and is summarised in Table 1 below.

For the training centre we assume an academic institution such as City University will donate the site space however, this space would need to be renovated to meet the training facility requirements. Based on previous estimates for rehabilitating the UNIDO-Volvo training facility in Ethiopia, and assuming costs are greater in Somalia given the lack of infrastructure we estimate the rehabilitation to cost US\$250,000.

The students would be provided accommodation at hostels nearby the training facility, based on average student accommodation costs in Mogadishu we assume accommodation costs of US\$6000 per student. This is equivalent to US\$180000 per year for 15 students and would be incurred in Year 2 with the first intake of students. Providing security at the training facility brings additional costs to the facility. We estimate this cost at US\$10,000/month. This is based on average security costs for NGO compounds in Mogadishu, however this cost could be shared between the university and the training facility.

Based on discussions with SERC, the training equipment is estimated to cost a total of US\$150,000. The training kits for T1 and T2 training cost approximately US\$1,400 each. Initially, the PPDP facility will likely need 4 training kits for T1 and T2 training offer. The equipment required for T3 training is estimated at US\$130,000, however the private sector could provide this at heavily subsidised prices. SERC received a 90% discount on this equipment, while SARETEC received most of its equipment as a donation from industry. We therefore assume the cost for T3 training is likely to cost around US\$13,000, however for the purposes of the budget we include the full cost including an additional buffer to account for importing the equipment into Somalia.

We assume maintenance costs of 10% per year from Year 2 and Year 3. Based on discussions with stakeholders we assume developing training materials will cost roughly US\$3000, and US\$5000 to develop an online training module to test and refresh technical skills.

Toolkits will be provided at US\$200 per student for T1/T2 courses and US\$2000 per student for advanced courses. These toolkits would include the basic tools required for installing and maintaining solar installations. This is roughly equivalent to US\$3000 for basic toolkits for 15 students and US\$30,000 for the more advanced toolkits.

Training of trainers could be provided at SERC. We assume the facility will need 3 trainers. The fees for the T1/T2 course is US\$400, and US\$1000 for the T3 training. To top up the training, we assume the trainers would also receive training abroad. Based on a cursory search of training of trainer offers in Europe, this is estimated at roughly at US\$16,000 per course. The ToT costs will also need to account for flights and accommodation both in Kenya and abroad, this is estimated at roughly US\$7700 for 3 trainers.

Both training institutions interviewed as part of this study emphasised the need for external expertise. An expert consultant from GIZ spent a couple of years at SARETEC in South Africa, and similarly an expert has been with SERC since its establishment. Using figures from the UNIDO-Volvo experience and accounting for the security and political Somali context, we estimate this to come at a cost of US\$120,000 per year, from Year 2 onwards we assume the expert only works part time and would therefore cost US\$60,000 in Year 2 and 3. Staff remuneration also includes an international project coordinator paid at US\$60,000 (estimated using UNIDO-Volvo budget). Salaries for trainers are assumed to be equivalent to local NGO rates in Somalia

– above the national average at US\$8,500/year. We assume two support staff to provide administrative and office management at US\$4,000/year.

Additionally, to ensure sufficient demand from private sector and prospective students, a communications strategy including an awareness raising campaign and marketing would cost US\$10,000. We assume additional marketing would be required for Year 2 and 3. Website design is estimated to cost around US\$2,000.

Other miscellaneous costs are estimated at US\$40,000 including internet and utilities.

Table 1 Proposed budget for PPDP implementation

Budget (USD)	Year 1	Year 2	Year 3
Training Facility	370,000	300,000	300,000
Equipment	140,100	48,400	0
Training of Trainers	64,400	0	0
Remuneration of Staff	214,000	154,000	154,000
Developing Training materials	8,000	0	0
Communications	12,000	5,000	5,000
Sundries	40,000	40,000	40,000
Total	848,500	547,400	499,000

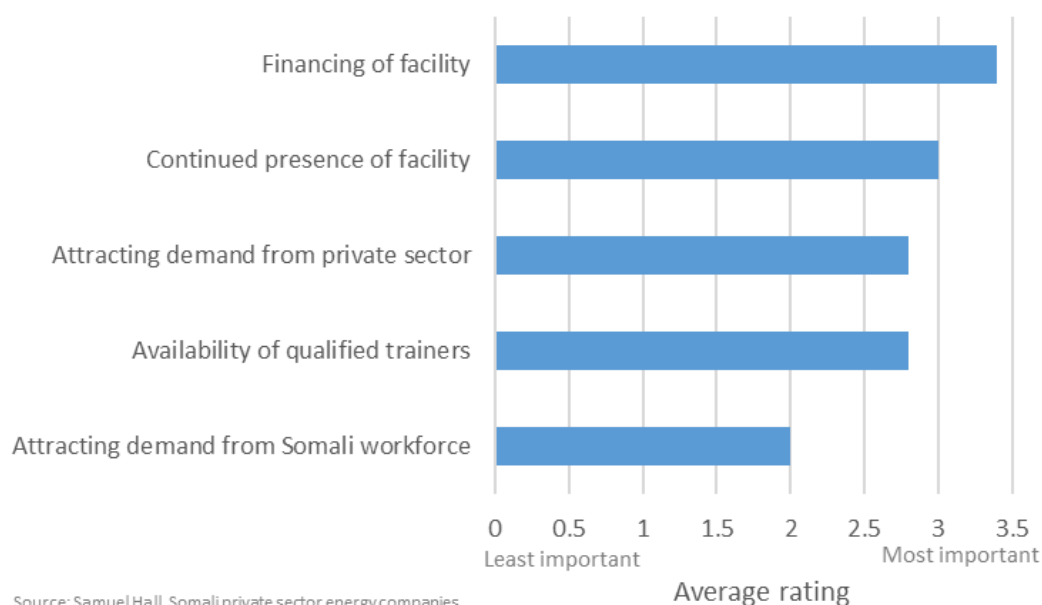
Exit strategy

Experience has shown that a short-term phase out of donor support after a few years is not possible in post-conflict states. Ultimately, in the context of this PPDP, an exit strategy for the donor and the liaison partner will depend on how much scaling and replication is planned and whether this requires further funding. Indeed, a continued presence of this facility was identified as one of the key challenges by survey respondents, with only financing rated as a bigger challenge (see Figure 26).

The GIZ who funded the initial set up of SERC continues the engagement with the facility through continued co-funding of the technical expert and providing stipends to students. In exchange, GIZ uses SERC for consultancy services. A similar approach can be envisaged for the proposed PPDP where the training centre’s developing expertise is drawn upon for consulting and research needs, and to ensure that students in need are able to receive funding for their tuition fees.

That said, a self-sustaining financial model would require the training facility to carry out active business development to find revenues. This could involve for example allowing private companies to carry out training on their own products for internal staff. Tuition fees would also have to be increased eventually. Much of this depends on the further development and expansion of Somalia’s energy sector and more generally the country’s economy and energy needs.

Figure 26 Survey question - What are the main challenges in establishing a training facility?



Future M&E – Key indicators

The following indicators have been identified to measure achievements and impact of the training. These indicators will help assess the performance of the training facility over time. Samuel Hall recommends an initial evaluation after Year 2 and a full evaluation after Year 5 of the facility coming into operation.

Figure 27 Key indicators

Certification mechanism

- PPDP facility has successfully developed a certification scheme for technicians across Somalia in collaboration with Association of Somali Universities by Year 1

Students

- 15 students enrolled in each training module (30 students trained in Year 1)
- 3 trainings offered in parallel by Year 5 (90 students trained in Year 5)
- Women represent 50% of student enrolment by Year 5
- All students complete at least 3 months on-the-job training by Year 1

Finance

- Entrepreneurship package (solar loan and stock) developed with existing microfinance institution and PPDP facility by Year 1
- 50% of graduates from non-technical stream access finance from PPDP facility

Stakeholder engagement

- At least 5 Memorandum of Understandings signed with private partners
- Private sector satisfied with level of training offered by training facility
- Government endorses training facility by Year 1

Employment

- 90% of graduates find employment within 6 months


10. Conclusion and Recommendations

To answer the original research question for this study, several key dimensions emerged that trigger a number of recommendations in ensuring that the PPDP initiatives is successful in bridging the skills gap and ensures a sustainable impact on the local population. These dimensions and corresponding recommendations have been summarised below:

How can a PPDP initiative successfully bridge the renewable energy skills gap in the Somali power sector while ensuring a sustainable impact on the local population?

KEY DIMENSION OF PPDP	RECOMMENDATIONS FOR ACTION	
	<i>IMMEDIATE</i>	<i>MEDIUM- TO LONG-TERM</i>
NECESSITY	The need for a technical skills training centre for renewable energy skills in Somalia is necessary and urgent.	To be effective and maximise benefits to the local population, the PPDP's role has to go beyond renewable energy skills deployment and engage at policy level.
GOVERNANCE	From the outset, roles and responsibilities of each key actor should be outlined in MoUs. The objectives of the PPDP facility should be clearly communicated to all stakeholders, including those directly involved and any consulting partners.	The PPDP should work with steering committees to address dimensions that will go beyond the day-to-day teaching.
EXTERNAL COORDINATION	Various donors are considering renewable energy skills training initiatives with varying scopes and approaches across Somalia. These initiatives should be coordinated to avoid the creation of unwanted future obstacles.	Coordination should ideally lead to defining a coherent and replicable training curriculum that will enable the development and promotion of a joint certification mechanism across Somalia. Potential opportunities for replication of the model should be assessed.
GENDER EQUALITY	Student recruitment should specifically address prospective female students. Awareness raising campaigns for renewables should feature women. The curriculum should be designed with a view to addressing women's needs for flexible course schedules and potential financing requirements for tuition fees.	Current experience has shown that the goal of 50% female graduates may not be achievable from the outset but should be a key goal by Year 5 at the latest. Availability of a microfinance facility can improve opportunities for women in entrepreneurial jobs in the renewable energy sector.
TECHNOLOGY	Offgrid solar products are of primary interest in the context of rural electrification. But to remedy existing challenges, basic electrical skills also need to be trained for the sake of	To anticipate market evolution, the training facility needs to teach skills related to grid-tied installations and microgrids, and convey basic

	improving health and safety of electrical installations in Somalia.	understanding of solar-based water pumping systems.
ECONOMIC IMPACT	Graduates will fill an immediate gap in the market for the installation and operations and maintenance of renewable energy installations. The provision of toolboxes to graduates will have the role to project a positive image of workmanship in the wider electrical sector.	The PPDP should consider driving the deployment of renewable energy technologies in Somalia by engaging in awareness-raising campaigns in rural communities. Consumer microfinance should also be considered as an option to enable deployment of small-scale installations, as well as skills training on ICT for pay-as-you go schemes.
LOCATION AND REGIONAL CONTEXT	Existing training programmes in Kismayo, Mogadishu and Hargeisa should be carefully reviewed as to whether scaling-up is a possibility, rather than starting from zero. Any limitations for regional outreach should be taken into account.	Independent of where the training facility will ultimately be based, the regional angle to any training facility should not be ignored and stakeholders from all three regions and administrations should be involved from the outset as described in this study.
TEACHING MODEL AND CURRICULUM	The proposed training facility should formalize the practical, on-the-job training that is already present in most energy companies in Somalia. The training should be a combination of theoretical classroom- and workshop-based training. As outlined in this study, in addition to the technical training, a non-technical specialisation should be included, above all to allow women an entry point into the renewable energy sector	Graduates should be encouraged to return to the training centre for regular skills upgrades. Especially women that have undertaken the basic technical training and then opted for non-technical specialisation should be contacted regularly and receive offers to acquire further technical qualifications.
FINANCING	In Year 1, Samuel Hall estimates a budgetary requirement of USD850, 000 to establish the centre and get the first training courses underway. Commitment for follow-up funding of around USD500, 000 per year will be required.	Ensuring continued financial support is key to long-term success of the facility. Further funding may be needed beyond the initial set-up, especially for subsidizing tuition fees. Income can be generated in future by turning the facility into a stronger R&D base for the Somali renewable energy sector.
IMPLEMENTATION	Samuel Hall envisages a 3-year process until a first formal, independent review of the facility's progress – the donor and liaison partner should work closely during the initial implementation phase.	Experience has shown that a short-term phase out of donor support after a few years is not possible in post-conflict states. Ultimately, in the context of this PPDP, an exit strategy for the donor and the liaison partner will depend on how much scaling and replication is planned and whether this requires further funding.



The proposed training centre should aim for being more than a mere educational facility but develop a vision that will ensure that Somalia maximises the benefits of renewable energy technologies for its power system. Similar to other initiatives in the region, it has the opportunity to become a focal point for the renewable energy sector in Somalia. As such a focal point, it can push a bottom-up approach to develop necessary policies and regulatory frameworks to help guide the deployment of renewable energy technology and improve conditions in the wider power sector. Such an approach should positively contribute to Somalia's resilience ⁶⁰ : while improving the environment for local and external investors, the local population benefits from improved safety and cleaner energy supply.

Resilience: *“Resilience is the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth”*. (USAID, 2016)

⁶⁰ USAid, <https://www.usaid.gov/resilience>, accessed 22 October 2016

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Annex II: Other donor initiatives

UNDP is considering funding a renewable energy park, hosted within an existing academic institution. As part of this renewable energy park, UNDP would want to establish a training academy, which would run short and long programs on renewable energy. They are considering hosting this park at the Somali National University in Mogadishu.

NRC has established a big training centre in Kismayo. As part of the Youth Education Pack programme of work the training centre offers skill training on renewable energy alongside other training modules. The RE skills training was established with the help of GIZ and SolarGen. Kismayo is a pilot project but with potential plans to roll out the programme to other areas.

City University currently has a renewable energy skills training program. So far they have trained a class of 20 students on solar energy. Currently City University is looking to formalise this program. The training is currently run by SolarGen, who also have a contract to implement solar lighting. This training was driven by SolarGen running short of technicians. SolarGen recruited Kenyan technicians but these technicians have now returned to Kenya. As a result, SolarGen is now working with City University to develop a local skilled workforce. The current training offer is 2 weeks long. Once completed they receive a certificate from CU. If graduates continue to practice for some time they can proceed to get Tier 1/Tier 2 accreditation.

USAID is considering implementing a training facility in Hargeisa as part of the Growth Enterprise, Employment and Livelihoods (GEEL) program. The training facility would be established at the airport. The prospective plans include a demonstration site for solar projects and a training facility.

The Energy Security and Resource Efficiency in Somaliland (ESRES) Programme aims ‘to strengthen energy security and access in Somaliland through diversifying Somaliland’s energy sources with the introduction of a renewable component’. The programme is implemented in two phases. As part of the second phase ESRES is considering allocating some of Phase 2’s £15m budget towards a yet undefined skills agenda. ESRES would be open to being involved in the development of this training facility but would not want to take the lead on any such initiative. They would want to collaborate with other partners to implement this skills agenda.

The African Development Bank is proposing implementing a technical training facility for infrastructure development as part of their Somalia Infrastructure Fund. AfDB is looking to get approval for \$5 million funding in 2018-19 for Phase 1 (covering 2017-2021) and possibly an extra \$5 million for follow-up work. The main objective of this project is to establish a technical training institute (TTI) to provide skilled staff to design, build and maintain infrastructure projects. The scope of the TTI is Somalia wide although a specific location has yet been selected.

Following the Renewable Energy Forum hosted by the Shuraako Foundation, there was a commitment to establish technical and poly technical training programs. To fulfil this commitment Shuraako has begun work to scope, design and implement the Somali Renewable Energy Technical Training Institute (SRETTI) in Somaliland. This project will be implemented in three phases, Phase 1: Mapping and Stakeholder Commitment, Phase 2: Planning and Design Phase, Phase 3: Implementation Phase (which includes securing funding commitments).

Samuel Hall is a research and consulting company based in Central Asia (Kabul, Afghanistan) and East Africa (Nairobi, Kenya). We specialise in socio-economic surveys, private and public sector studies, and impact assessments for non-governmental and international organisations. Our teams of field practitioners, academic experts and local interviewers have years of experience leading research in Central Asia and East Africa. This has enabled us to acquire a firm grasp of the political and socio-cultural context in the country; design data collection methods and statistical analyses for monitoring, evaluating, and planning sustainable programmes; and to apply cross-disciplinary knowledge in providing integrated solutions for efficient and effective interventions. To find out more, visit www.samuelhall.org.

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