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► Employment Impact Assessment of the Green Mini- Grid (GMG) Facility, Kenya: Additional 20 Mini-Grid Sites in Turkana County, Kenya



► **Employment Impact Assessment of the Green Mini-Grid (GMG) Facility, Kenya: Additional 20 Mini-Grid Sites in Turkana County, Kenya**

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International Labour Organization (ILO)



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Executive summary

The ILO's STRENGTHEN2 project is conducting employment impact assessments of investments in sub-Saharan Africa to promote the creation of more and better jobs. The report provides an employment impact assessment of the Green Mini-Grid (GMG) Facility in Kenya, focusing on the development of 20 additional mini-grid sites in Turkana County. It follows on from a previous assessment of 33 mini-grid sites under the EU-funded phase of the project (GMG2). Employment is measured using the same approach as before, quantitative and qualitative data were collected through observations during a field visit, semi-structured interviews and a questionnaire to obtain information on the operational side of mini-grids and on direct employment generated from the design and construction phase. Temporary non-direct jobs were estimated using the ILO's Structural Model for Sustainable Development (SMSD).

Based on data availability, the number of jobs created are expressed as either the headcount, which includes all workers, whether full-time or part-time. For the estimates on direct employment, jobs are also expressed in terms of the full-time equivalent (FTE), which totals the hours worked by all employees to compute the number of full-time positions. The results estimate that the additional 20 mini-grid sites in Turkana county produced:

- ▶ 70 permanent direct jobs and 88 temporary non-direct jobs (annualized FTE)¹ were created through the design, construction, operations and maintenance of the project
- ▶ This leads to an estimated 7.9 FTE direct jobs created per mini-grid site
- ▶ For the non-direct temporary employment effects, 207 jobs are estimated, expressed as the headcount
- ▶ For direct employment, per million euros invested, it is estimated that 36 FTE jobs are created.

Similar to the previous assessment, the results indicate a bias towards male and unskilled jobs. Youth employment accounts for 80 per cent of jobs during the construction phase. Temporary non-direct jobs fall mainly within the Agriculture sector. To address these gaps, it is recommended to support vocational training programmes to develop local skills, with a particular focus on youth and women, to increase their participation. To increase the non-direct temporary employment, the project should consider the increased use of locally sourced materials and services during construction and operation phases, which would help boost local supply chains and create more non-direct temporary jobs.

This analysis adds to the pool of research forming on mini-grid construction in Kenya and across the continent more widely as part of the STRENGTHEN2 project. Drawing on comparisons from the previous assessment of 33 mini-grid sites in Western Kenya, recommendations can be made for promoting decent job creation within the sector. Some differences on the number of jobs created could be observed across the two assessments, mainly due to some activities not yet being completed for the construction of sites in Turkana. Different CAPEX breakdowns were also used for the estimation of non-direct temporary jobs and the results reinforce the need to lessen the reliance on imported components during construction.

¹ Annualized is referring to jobs for a one year duration of the project.

Résumé exécutif

Le projet STRENGTHEN2 de l'OIT réalise des évaluations de l'impact sur l'emploi de projets d'investissement en Afrique subsaharienne afin de promouvoir la création d'emplois plus nombreux et de meilleure qualité. Le rapport fournit une évaluation de l'impact sur l'emploi du programme de mini-réseaux écologiques (MRE) au Kenya, en se concentrant sur le développement de 20 sites de mini-réseaux supplémentaires dans le comté de Turkana. Il fait suite à une précédente évaluation de 33 sites de mini-réseaux dans le cadre de la phase du projet financée par l'UE (MRE2). Les données quantitatives et qualitatives ont été collectées par le biais d'observations lors d'une visite sur le terrain, d'entretiens semi-structurés et d'un questionnaire afin d'obtenir des informations sur l'aspect opérationnel des mini-réseaux et sur les emplois directs générés par les phases de conception et de construction. Les emplois temporaires non directs ont été estimés à l'aide du modèle structurel de développement durable (SMSD) de l'OIT.

En fonction de la disponibilité des données, le nombre d'emplois créés est exprimé en termes d'effectifs et inclut tous les travailleurs, qu'ils soient à temps plein ou à temps partiel. Les estimations d'emploi direct sont exprimées en termes d'équivalent temps plein (ETP), qui totalise les heures travaillées par tous les employés pour calculer le nombre de postes à temps plein. Les résultats estiment que les 20 sites supplémentaires de mini-réseaux dans le comté de Turkana ont produit :

- ▶ 70 emplois directs permanents et 88 emplois temporaires non directs (ETP annualisés)², qui ont été créés par la conception, la construction, l'exploitation et la maintenance du projet.
- ▶ Ceci conduit à une estimation de 7,9 emplois directs ETP créés par site de mini-réseau.
- ▶ Pour les effets non directs sur l'emploi temporaire, 207 emplois sont estimés, exprimés en nombre de personnes.
- ▶ Pour l'emploi direct, par million d'euros investi, on estime que 36 emplois ETP sont créés.

Comme pour l'évaluation précédente, les résultats indiquent un biais envers les emplois masculins et non qualifiés. L'emploi des jeunes représente 80 % des emplois pendant la phase de construction. Les emplois temporaires non directs relèvent principalement du secteur de l'agriculture. Pour combler ces lacunes, il est recommandé de soutenir les programmes de formation professionnelle afin de développer les compétences locales, en mettant particulièrement l'accent sur les jeunes et les femmes, afin d'accroître leur participation. Pour augmenter le nombre d'emplois temporaires non directs, le projet devrait envisager d'utiliser davantage de matériaux et de services d'origine locale pendant les phases de construction et d'exploitation, ce qui contribuerait à stimuler les chaînes d'approvisionnement locales et à créer davantage d'emplois temporaires non directs.

Cette analyse vient s'ajouter à l'ensemble des recherches menées sur la construction de mini-réseaux au Kenya et plus largement sur le continent dans le cadre du projet STRENGTHEN2. En s'appuyant sur les comparaisons de l'évaluation précédente de 33 sites de mini-réseaux dans l'ouest du Kenya, des recommandations peuvent être formulées pour promouvoir la création d'emplois décents dans le secteur. Certaines différences sur le nombre d'emplois créés ont pu être observées entre les deux évaluations, principalement en raison de certaines activités qui n'ont pas encore été achevées pour la construction de sites à Turkana. Différentes ventilations du CAPEX ont également été utilisées pour l'estimation des emplois temporaires non directs et les résultats renforcent la nécessité de réduire la dépendance à l'égard des composants importés pendant la construction.

² Les chiffres annualisés se réfèrent aux emplois pour la durée d'un an du projet.

Introduction

The STRENGTHEN2 project aims to leverage employment impact assessment (EmpIA) in sub-Saharan Africa for the creation of more and better jobs. STRENGTHEN2 is working to assess the employment impact of infrastructure investments in Kenya, among other countries. The Green MiniGrid Facility (GMG) programme enhances access to energy in Kenya by encouraging private investment in renewable energy-based mini-grids. It aims to support economic development in rural communities through productive usage of electricity and job creation, improving the lives of 100,000 Kenyans whilst respecting the environment. The project is funded by the United Kingdom's Department for International Development (DFID) (now the Foreign Commonwealth and Development Office (FCDO)) and the European Union (EU). The first phase, GMG1, was funded by DFID and was completed in October 2020, four years after it began in 2016. The second phase, GMG2 is funded by the EU and currently under implementation by the Agence Française de Développement (AFD).

This report is a continuation of the EmpIA of the Green Mini-Grid (GMG) Facility in Kenya as part of the STRENGTHEN2 project (Oyuma et al., 2023). The initial report focused on the employment outcomes of GMG2 estimated 33 sites, which was co-funded by the European Union, and aimed to enhance energy access through the establishment of mini-grid sites across various regions in Kenya. The first assessment provided substantial insights into the direct, indirect, and induced employment generated by the programme, emphasizing its potential in promoting job creation and economic development, particularly in underserved communities in Western Kenya. This assessment builds on this work with the development of 20 additional sites being constructed in Turkana county, aiming to provide an estimate of the direct and non-direct temporary employment effects these additional sites would produce.

The previous assessment (Oyuma et al., 2023) estimated the creation of 4,407 jobs in total (headcount), with 3,755 being direct jobs primarily generated during the design and construction phases. The remaining 652 jobs are categorized as indirect and induced employment, mostly within the services sector. The assessment discovered that there was a noticeable bias towards male and unskilled labour, with high youth employment constituting 86 per cent of construction phase employment. The report highlights the importance of enhancing local production to increase job creation and recommends further investment in sustainable energy solutions to provide long-term economic benefits to underserved communities.

Renewable energy developer Rural Village Energy Solutions (RVE.SOL) supports the scale-up of its innovative multi-sector KUDURA Power East Africa (KPEA) business in Kenya. KPEA aims to power rural villages, rural schools, rural clinics and hospitals as well as small-scale farms, businesses and private residences. It aims to offer rural communities high-quality, sustainable, and renewable energy on an affordable PAYG basis. Already active with 11 sites in Busia county under GMG1, KPEA planned to construct 22 sites under GMG2. Due to problems encountered with national restrictions on placement of mini-grid sites in relation to the national grid, it was necessary to relocate the planned sites. It was decided to construct the sites instead in Turkana county. This assessment of GMG project, specifically focuses on its implementation in the Turkana region through the establishment of these 20 additional mini-grids. This follow-on assessment aims to evaluate the anticipated employment impacts of these new mini-grids, considering both the opportunities and challenges unique to the Turkana region. The analysis will explore the employment potential during the design, construction, and operational phases of these new sites. The non-direct temporary employment effects are estimated from the inputs used in the construction phase, to provide a comprehensive understanding of how the extension of the GMG project could further contribute to local economic growth and sustainable development in Kenya.

By leveraging the lessons learned from the initial phase, this report seeks to provide actionable recommendations for enhancing the employment impact of the GMG programme as it expands and for future projects in the renewable energy sector. The findings are intended to inform policymakers, project developers, and stakeholders about the broader socio-economic benefits of investing in renewable energy infrastructure, particularly in remote and marginalized areas.

Methodology

This paper provides qualitative descriptions as well as typical quantitative employment impacts observed from the mini-grid deployment efforts at the design and construction phase, as well as some projected impacts at the operational phase. Information was collected from observations during site visits and follow-up semi-structured interviews with KPEA lead personnel in Turkana. Consultations and Key Informant Interviews (KII) with KPEA management, as well as data abstraction from company records also formed part of the data collection process. The interviews informed analysis on operational strategies, organizational structure, and employed workforce. The information gathered was complemented by a literature review and data from secondary sources, including the developers' project documentation. Two of the 20 mini-grid sites (Makutano and Nasiger) were visited during the field mission conducted in November 2023 (Figure 1).

The mini-grids in Turkana are expected to be fully commissioned by Q2 2025 (at the time of the field mission in October 2023, the mini-grids were still in the construction phase). During the household mapping/feasibility surveys, each site was expected to reach an average of about 100-200 connections (average of 162 per site). The 20 new KPEA mini-grids would have an edge/advantage over some few pre-existing mini-grids in the study areas, which have since been ineffective in supplying constant electricity to their consumers – there have been persistent complaints from the local community on frequent power outages even during the day, resulting from poor management, dilapidated equipment, and poor maintenance.

► **Figure 1. Photographs of sites during field visits**



Makutano (left) and Nasiger (right) mini-grid sites visited during the field mission in Turkana.



Examples of local geography and communities to be served by the mini-grid sites in Turkana.

To estimate the temporary non-direct employment effects, capital expenditure breakdowns for the mini-grid sites were provided from the developer. The breakdowns covered eight categories relating to mini-grid construction, and these categories were mapped to the corresponding GTAP SAM/IO sector for use in the ILO's Structural Model for Sustainable Development (SMSD). The model was developed at the ILO and is based on a framework that adopts elements of the input-output (IO) analysis modelling framework while incorporating additional features such as price effects and capacity constraints.

The model has been applied in a few country pilots and case studies (La Marca and Jiang 2021) and can be adapted to meet the needs of the impact assessment analysis as it has the flexibility to: (a) incorporate factual features of low-income developing economies with chronic underemployment and commodity dependence; (b) achieve internal consistency between the real time horizons of the impacts of the shock to be assessed and the model presumptive adjustment time; and (c) maintain a close correspondence between the model and internationally agreed statistical concepts and definitions (Jiang and La Marca 2021).

The total employment created from these additional 20 sites of the GMG program investment is obtained taking into consideration only the goods and services demanded within the country by different sectors of the economy. The cost of all imported goods used in the GMG project were subtracted to avoid overestimating its job creation impact. The logic behind this procedure is that imported goods generate jobs in a country outside Kenya. Since our interest is in domestic job creation, the cost of imports is eliminated. From the data collected, three types of goods were imported, including solar modules, battery storage and part of the meters and reticulation, making up 46 per cent of the total goods.

Direct employment results

► 1. Design and construction phase

Taking the example of a typical mini-grid site, the construction and deployment of mini-grids span approximately 1-4 months (i.e. pre-construction, modular grid instalment, powerhouse construction, pole erection, and wiring). Once construction and deployment are completed, these functions and the associated jobs are no longer needed. At the time of the field mission in October 2023, only procurement of some electrical components, most construction materials, fencing and gates of the mini-grid sites, and the distribution lines (Low Voltage Network) had been completed (save for 2 sites). The production and generation of electricity had not yet been done. Similarly, the provision of the connections that allow customers to use electricity had not yet been done. Procurement involved materials obtained locally (poles, fencing, fabrication, binding wire, cement, sand, gravel, ballast, cabling) and those imported (meters and power systems).

The fencing (already completed) employed 6 casual workers per day (from the nearby villages), each paid KSH 500 per day, and worked for approximately 1 week (per site). The distribution lines (LV network) comprised excavation, moving and erection of poles. For the excavation of each hole, casuals were paid between KSH 1,000 to KSH 1,500 depending on the land surface or topography of the area. Moving poles was manual and involved outsourced labour (outside Turkana) with the persons typically referred to as linesmen. Loading and off-loading for the LV network as well as pole erection also involved casual labour that could go up to 10-12 persons per site. The LV network casuals would work for a duration of about 2 weeks on the average. Transporters were also hired from within the county for transportation of most of the construction materials. The local community supports most of the activities, particularly the unskilled part of labour.

On the customers side, activities would involve dropping cables and installing meters, and would include labour from linesmen (who would climb the poles for dropping) and the technicians who would connect the individual customers/houses. On the generation side, the installation activities would involve contracted/outsourced skilled personnel with the support of KPEA staff. It is estimated that 5-6 individuals working for 2 weeks per site would be involved at this stage. Table 1 provides typical estimates of direct employment (jobs) created during design/feasibility and construction phases for a typical KPEA mini-grid site in Turkana.

► **Table 1. Design and Construction Phases: Temporary Jobs Created at a typical Mini-Grid Site in Turkana**

	Activity/Staff Involved	No. of Staff	Duration (Days)/ Month	Months / Year	Hrs Per Day	Total Hrs	Annualized FTE	Type of Contract	Av. Daily Wage (KSH)
Design/ Feasibility Phase (1 Month)	Household Mapping	4	25	1	8	800	0.4	P	2,700
	Estimate of Materials	1	25	1	8	200	0.1	T	3,200
	Logistics (Drivers)	1	25	1	8	200	0.1	C	1,080
	Mgt/ Administration	1	25	1	8	200	0.1	T	10,360
	Total	7					0.7		
Construction & Commissioning Phase (1 Month)	Permanent Staff	4	25	1	8	800	0.4	P	2,700
	Fencing	6	7	1	8	336	0.2	W	500
	Holes/Excavation (Females)	10	12	1	5	600	0.3	W	1,500
	Holes/Excavation (Males)	20	12	1	5	1,200	0.6	W	1,500
	Distribution	15	25	1	8	3,000	1.4	W	500
	Erecting Poles (Females)	2	12	1	8	192	0.1	W	500
	Erecting Poles (Males)	8	12	1	8	768	0.4	W	500
	Dropping/ Metering (Females)	3	9	1	8	216	0.1	W	500
	Dropping/ Metering (Males)	7	9	1	8	504	0.2	W	500
	Drivers (Logistics)	1	21	1	8	168	0.1	W	1,080
	Total (1 Mini-Grid)	76					3.7		

Notes: Type of Contract: P=Permanent Contract; T=Temporary Contracts/Outsourced Personnel; C=Casual Workers (very short term) WITH Contracts; W=Casual Workers (very short term) WITHOUT Contracts.

*** No data was provided for overheads and wiring (construction phase) as it appears these were not yet employed in Turkana.

Source: KPEA Data collected in November 2023, (from Senior Construction Supervisor and HSES Manager).

The product of number of staff, number of days worked, number of hours worked per day and number of months worked in a year was computed and the result divided by 2,080 (8 hours a day, 260 days in a year) to estimate the number of full-time equivalent annualized (FTE) jobs. Since the design and construction phases last about one month each, with very short-term jobs, the total FTE job coefficients were derived from such direct short-term jobs to depict the number of annualized jobs created from short-term contractual work. Data have been averaged to calculate the amount of employment generated per one mini-grid site. These figures have then been extrapolated to provide an estimation of the direct jobs created for the second phase of the GMG project, for a total of 20 new mini-grid sites (GMG2) in Turkana.

Based on the above projections, a mini-grid deployment effort in Turkana has the potential of creating an estimated 4.4 annualized FTE jobs during the design and construction phases. For the 20 sites, this would equate to 88 FTE jobs.

During the design/feasibility phase, four permanent skilled staff conduct surveys and household mapping exercises as well as managing logistics for community engagement, acquisitions, and procurement. They are assisted by one hired person, who estimates the quantities of materials required, and one driver. One management person oversees accounts, design, procurement, and

operations. From the semi-structured interviews, it was noted that approximately 57 per cent of these workers are from the local community, while youth (18-35 years) represent about 86 per cent. No females were reported during the design/feasibility phase.

During the construction phase, four permanent skilled staff oversee the mini-grid installation and manage the casual workers, who are normally on very short contracts. The permanent staff are also responsible for overseeing the modular grid and powerhouse installation. Nevertheless, building the modular grid and powerhouse is normally subcontracted to third-party companies due to skills required (and includes civil works and installation for generation, grid, and reticulation). Workers involved in fencing, as well as pole erection and distribution lines (holes/excavation, distribution, erecting poles) are usually unskilled workers (n=61), all from the local community, with youth representing about 80 per cent. Females seem to be involved in excavation (n=10), pole erection (n=2) and dropping/metering (n=3) during the construction phase, accounting for 23 per cent of these jobs. Workers involved in connections and household wiring (dropping and metering) are usually skilled workers. It is however important to note that no data was provided for overheads and wiring at the households as it appears these were not yet employed in Turkana.

► 2. Operations and maintenance phase

The operations and maintenance phase will create direct full-time jobs that will last the lifetime of the mini-grid sites. During the operation of the 20 new mini-grid sites, it is anticipated that there would be 2 site agents per site and 1 caretaker per site (previously referred to as security guards). Notably, the 20 mini-grid sites in Turkana had been grouped into 4 lots (of average 4/5 mini-grid sites each). These lots are named Kakuma, Lakeside, Lokichar and Lodwar. Each lot has a Lead Site Supervisor who oversees all the operations for the 4/5 mini-grid sites under their lot. Each lead site supervisor is also assisted with a technician – they will work together in monitoring, periodic maintenance, cleaning (panels and internal systems) and new connections. Occasionally, temporarily contracted engineers and technicians would be hired based on workloads of existing staff when there is additional work to be conducted. There is one driver hired during the operations and maintenance phase. The permanent staff also interface with the local site agents/customer experience liaison teams. Table 2 below provides estimates of direct jobs envisioned by occupation during the operation and maintenance phase for all the 20 new mini-grid sites in Turkana.

► **Table 2. Estimated jobs to be created at the 20 mini-grid sites during Operation and Maintenance**

Activity/Staff Involved	No. of Staff (FTE)	Type of Contract	Estimated Av. Daily Wage (KSH)
Lead Supervisors (Permanent Staff)	4	P	2,700
Technicians	4	T	2,000
Site Agents	40	C	1,080
Care takers	20	C	
Logistics (Drivers)	1	C	1,080
Total (20 mini-grids)	69		

Note: Type of Contract: P=Permanent Contract; T=Temporary Contracts/Outsourced Personnel; C=Casual Workers WITH Contracts.
Source: KPEA Data collected in November 2023, (from Senior Construction Supervisor and HSES Manager).

Based on the above projections, a mini-grid deployment effort in Turkana has the potential of creating an estimated 3.5 FTE jobs during the operations and maintenance phase (total of 69 divided by 20). This could imply two FTEs in the community and one FTE at the central

office/headquarter. It is important to note that these are reported (anticipated) estimates, and the final figures may change during the actual duration of operation. All the staff work full time, so the headcount is treated as the FTE.

Data was also collected on the costs of construction materials for the 20 mini-grid sites (Table A.2 in the annex). The total expected cost for the 20 mini-grid sites in Turkana is estimated at EUR 4,464,577 (excluding statutory charges – VAT). This means that the average estimated cost of construction per mini-grid site is EUR 223,229. At the time of the field mission, and during the household mapping/feasibility surveys, the estimated number of connections for all the 20 sites was 3,242, translating to about 162 connections per site. However, it is further estimated that after densification, there would be a total of over 5,000 connections.

► 3. Summary of direct employment

A summary of direct employment at GMG mini-grid sites in Kenya (based on the 20 mini-grids in Turkana), expressed as annualized FTE is presented in Table 3. In total, 69 of these FTE were permanent jobs generated during the operations and maintenance phase. The remainder of the jobs, 83, were during the design and construction phase. On average, for a typical mini-grid site, 7.9 FTE jobs are estimated to be created. Summarising across all 20 sites, the estimated permanent jobs created are 70 and temporary jobs created are 88.

Only 23 per cent of jobs during the design and construction phase go to women, indicating a bias towards male jobs. The majority of workers during the construction phase (2.9 FTE jobs) were casual workers with no contract. This is typical for the construction sector and similar findings were discovered in the previous assessment of mini-grid sites in Busia, Kisii and Siaya. The previous assessment of 33 mini-grid sites had an average of 12.3 FTE direct jobs created per mini-grid site, compared to the 7.9 observed for the sites in Turkana. Although there are similarities in the composition of employment (gender, skilled vs unskilled, youth), the previous assessment estimated more jobs created which can mainly be attributed to the progress of the construction of the 14 projects. In theory, this could also be explained by jobs being performed by staff already employed by KPEA and less jobs required based on prior experience gained and the context of the new sites. However, when looking at the breakdowns of jobs, during the construction phase in Turkana, data was not provided for overheads and wiring as they were not completed at the time of the study. If this information was included (33 jobs for one site as estimated in the previous assessment), the number of jobs for the construction phase would be very similar.

When looking at the jobs created during the operations and maintenance phase, Turkana has a much higher number of jobs for site agents and caretakers (security). This is because the 33 sites in Western Kenya had only one site agent per site and one security guard, whereas in Turkana, there are 2 site agents and one security guard per site. This may be due to the context in Turkana, which requires more supervision due to insecurity.

Using the estimated cost per connection of EUR 1,378, there is an average of 726 connections per million Euros of investment. Considering the number of FTE jobs created per site, 7.9, produces an estimated 0.05 FTE jobs created per connection, based on the estimate of 162 connections per site. This provides an estimated number of 36 FTE jobs per million Euros of investment.

Looking forward and to generate more employment in the long-term, the estimated number of mini-grid sites, using the average of 162 connections per site, required to serve the KNES target of 35,000 households is 216, which could provide the potential to create an additional 1,706 annual FTE jobs. KNES (2018) suggests that 1.1 million households are outside the reach of the current KPLC grid. If the GMG programme were to expand massively and reach all these households, an estimated number of almost 54,000 annualized FTE jobs could potentially be created.

► Table 3. Summary of results on direct employment

Unit	Parameter	Value
Per one mini-grid site	Average investment per site (EUR)	223,229
	Design/feasibility phase, total Jobs (FTE) per site (temporary)	0.7
	Construction & commissioning phase, total Jobs (FTE) per site (temporary)***	3.7
	Operations & maintenance phase, total Jobs (FTE) per site (permanent)	3.5
	Total direct Jobs (annual FTE) per site (temporary + permanent)	7.9
Per connection	Estimated investment cost per connection, GMG2 (162 connections per site) – EUR	1,378
	Estimated no. of annualized FTE Jobs per connection (162 connections per site)	0.05
	Estimated no. of annualized FTE Jobs per € million of investment	36
Targets	Estimated no. of mini-grid sites required for 35,000 households target	216
	Estimated no. of annual FTE jobs created by 35,000 households target	1,706
	Estimated of annual FTE jobs created if GMG were to expand and reach 1.1 million households outside KPLC grid	53,617
Total sites (20 Turkana sites GMG2)	Estimated permanent annualized FTE Jobs created for 20 GMG2 sites	70
	Estimated temporary annualised FTE jobs created for 20 GMG2 sites	88

Note: ***No data was provided for overheads and wiring (construction phase) as it appears these were not yet employed in Turkana.
Source: Own research from the above KPEA data collected in November 2023.

Non-direct temporary employment results

The results were produced for a scenario of 20 mini-grid sites, the number of sites included in the extension phase in Turkana county. The results are highlighted in table 4, for non-direct temporary employment effects. These effects represent the non-direct temporary employment generated in the short to medium term along the supply chain, from the construction phase of the project and consumption effects as wages are spent by those direct workers. They do not include employment that may result from the long-term operation of the mini-grid sites. The estimated employment effects are determined by the magnitude and share of the project components which are linked to sectors. Several components consist of imported equipment, including solar modules, battery storage, part of diesel gensets and cables for metering and reticulation. These will not create jobs in the local economy and only the components that are produced in-country are taken into account in the employment estimations.

The results from the analysis with the SMSD show that Phase 2 of the GMG project is estimated to produce a total of 207 non-direct temporary jobs. These are disaggregated by sectors of agriculture, primary (including logging, fishery and mining), manufacturing and services. The highest number of jobs created fall under the agriculture sector, with a total of 103. The majority of jobs are male (apart from in the agriculture sector where a higher share of jobs go to women), with 116 compared to 91 female jobs.

There are an estimated 42 jobs for youth (young people aged between 15 and 24), which make up 20 per cent of total employment. Only 5 per cent of employment is estimated to be made up of skilled jobs, which are based on jobs within the services sector. It is estimated that the majority of jobs, 79 per cent, are informal. These jobs are expressed as headcount rather than FTE, due to a lack of information on working hours and a distinction between full time or part time jobs.

► **Table 4. Non-direct temporary employment effects for 20 mini-grid sites**

Sector	Skilled	Female	Male	Youth	Adult	Informal	Total
Agriculture	0	60	43	29	74	97	103
Primary	0	1	3	1	3	4	4
Manufacturing	0	16	30	6	40	29	46
Services	11	15	40	6	48	34	55
Total	11	91	116	42	165	164	207

Source: Own research.

When comparing these results on the non-direct temporary employment, 652 jobs were estimated across 33 sites within the previous assessment, compared to 207 for the 20 additional sites in Turkana. This indicates that less non-direct temporary jobs are created in these additional sites in Turkana county, compared to the sites in Busia, Kisii and Siaya. The composition of employment created is relatively similar to that estimated under the previous assessment, with a bias towards male, un-skilled and informal jobs. As the same developer was involved in the previous assessment and operations of sites is assumed to remain this same, this difference could be attributable to the context of the areas of operation. Turkana is a remote and sparsely populated area with limited economic activity and infrastructure compared to the other areas in Western Kenya. The local economy in Turkana is primarily subsistence-based and a combination of limited economic activity,

lower population density, and a less developed skills base could contribute to the reduced job creation observed in the mini-grid projects in Turkana.

That being said, a different CAPEX breakdown was provided for the additional 20 sites in Turkana, which could explain the difference in the non-direct temporary jobs created. There were some differences in expenses between the two groups of sites, for example, the majority of activities that do not use imported materials (civil works, distribution and part of metering and reticulation), had a larger share of the CAPEX for the sites in Busia. This is due to less civil works being underway at the time of the study, for the construction of the mini-grid sites in Turkana, where more of the costs were attributed to imported goods such as the solar panels, modules and battery storage systems.

Conclusions and recommendations

► 1. Summary of job creation

The assessment of the Green Mini-Grid (GMG) project in Turkana County, Kenya, has highlighted the employment generation potential across the 20 mini-grid sites. It is estimated that the construction of the 20 sites will generate 70 permanent direct jobs and 88 temporary direct jobs (annualized FTE). Per site, 7.9 direct annualized FTE jobs are to be created.

The employment created primarily involves unskilled labour, based on the tasks required with the sector and is reflective of the current labour market structure in Turkana county. For direct employment, there is a gender bias, with the majority of positions being filled by men. It was found that female employment only makes up 23 per cent of the jobs in the design and construction phase. This skew towards male employment is indicative of existing gender disparities, particularly in sectors like construction and maintenance, which are traditionally male dominated. Youth employment accounted for 80 per cent of jobs involved in construction (fencing, holes/excavation, distribution, erecting poles), all from the local community. Similar figures on youth employment (86 per cent) were observed for the previous assessment on 33 sites in Western Kenya.

In addition to direct employment, the project is projected to generate 207 non-direct temporary jobs, primarily within the agriculture sector, which stands to benefit most from improved energy access. The nature of these jobs is predominantly informal, with 79 per cent of them lacking formal employment status. This highlights a critical challenge in ensuring job quality and security within the region. Similarly to direct employment, the jobs generated are largely male-dominated (56 per cent), while youth make up only 20 per cent of the total jobs created. Skilled jobs account for just 5 per cent of the total jobs.

The analysis also touches on the broader long-term potential of the GMG programme, suggesting that if scaled up to reach 1.1 million households outside the Kenya Power and Lighting Company (KPLC) grid, the project could create an estimated 54,000 annualized FTE jobs. This expansion would significantly boost employment, not just in Turkana, but across Kenya. Realizing this potential requires strategic investments in skills development and employment initiatives to ensure that the jobs created are sustainable and contribute to long-term economic growth in the region.

This is the second assessment estimating the short and mid-term employment effects of mini-grids in Kenya, following on from the previous assessment on 33 sites in Western Kenya. The findings from this analysis add further weight to the results and recommendations of the prior to inform decisions for promoting decent work within the sector. The below similarities and differences can be summarized:

- **Direct jobs:** The number of direct jobs differs per sites between the two assessments, mainly due to activities such as wiring not yet being carried out in Turkana. If these were to be factored in, there would likely be a larger number of direct jobs created due to an increase in the number of site agents at the Turkana locations, which is necessary for the implementation of these mini-grid sites.
- **Non-direct temporary jobs:** The Turkana construction produced less non-direct temporary jobs, due to difference in CAPEX breakdowns supplied based on activities not being undertaken yet. However, there were also differences in the shares of costs that were attributed to imported goods. These were higher in Turkana which explains part of the reason why the estimated number of jobs is lower.

- **Gender, youth and skills:** Both studies revealed a bias towards male and un-skilled jobs, which is not unsurprising for the sector and similar research has revealed the same (PowerforAll, 2019). For youth employment, a similar amount of youth were employed across both locations, with a high level of youth employment during the construction phase and low youth employment estimated under the non-direct temporary jobs.
- Compared to other infrastructure projects, such as roads, this study reinforces the notion that the construction of mini-grids does not create as many jobs when looking at similar amounts of investment in projects across different sectors (energy and transport). This could be due to less labour-intensity required.

► 2. Recommendations

The two assessments on the short and mid-term employment effects of mini-grid development as part of the GMG project has highlighted recommendations for enhancing job creation in the sector. Due to the similarity in findings across the two assessments, recommendations are complimentary. The findings from this report highlight the importance for considering these recommendations to promote decent work in the construction of renewable mini-grids.

For the promotion of decent job creation in the direct employment of the project, that is generated through the design, construction, operations and maintenance of the mini-grid sites, a focus could be on local skills development for the skilled occupations required for mini-grid installation and parts of construction, which are usually outsourced due to skill requirements. Implementing vocational training programmes tailored to the specific needs of the mini-grid sector, such as renewable energy maintenance, construction, and technical operations, can significantly increase the proportion of skilled jobs within the local community. Such programmes should particularly target youth and women, who are currently underrepresented in skilled positions. By providing these groups with the necessary qualifications and technical expertise, the project can diversify its workforce and promote gender equality by increasing women's participation in direct employment. Conducting an ex-ante employment impact assessment at the beginning of future programmes could help to identify areas for targeting specific groups with training programmes.

As highlighted in the results and the relatively low numbers of non-direct temporary jobs, another recommendation is to promote local supply chains to maximize the economic impact of the project. Promoting local goods and services should be included in the design of future similar programmes to increase jobs. Supporting local enterprises by encouraging the use of locally produced materials and services during both the construction and operational phases can increase the non-direct temporary employment effects. This cannot be undertaken blindly, but economic efficiency still needs to be closely watched as well and well informed decisions taken.

There is also a need to increase formal employment opportunities within the project, particularly within the construction phase. Ensuring that all workers benefit from fair labour practices will enhance job quality and contribute to sustainable employment growth in Turkana county and other locations of mini-grid sites. Formal contracts should be a requirement from the beginning of the project for the hiring of workers for construction. This would improve conditions for workers and decent job creation.

References

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Annex

► Table A.1. Capital expenses for the 20 additional mini-grid sites

Financing Plan – Capital Expenses	% of Total	Total Budget (EUR)	Total Expected Project Expense (EUR)	Variance
Corporate & Project Development Costs (EUR)	6%	326,011	499,888	53%
Project Management & Overhead		56,000	296,545	
Project Development		250,000	131,692	
NEMA CAPEX Fees (0.1% of CAPEX)		4,141	3,493	
Logistics & Warehousing		15,870	68,158	
Mini Grid Construction Costs (EUR)	85%	4,475,347	3,964,689	-11%
1. Generation Plants exc. Duties & WHT	41%	2,168,451	2,229,227	-2%
2. Civil Works	100%	195,000	89,134	-2%
3. Public Distribution Network	13%	673,451	620,727	-8%
4. Consumer Reticulation & Metering inc. Ph4 Densification	15%	800,437	626,723	-22%
5. HSES & Security	3%	170,883	42,017	-75%
6. Contingency (5% of CAPEX)	4%	216,534	86,959	
7. Duties & Withholding Taxes	5%	250,590	269,903	
TOTAL CAPEX excluding VAT (EUR)		4,801,358	4,464,577	
8. Value Added Tax (VAT)	9%	494,865	232,980	
TOTAL CAPEX including VAT (EUR)	100%	5,296,223	4,697,557	

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