GET FiT UGANDA

ANNUAL REPORT 2022

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GET FiT UGANDA

Annual Report

2022

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Executive Summary

First full year of GET FiT portfolio operations. 2022 was the first year in which all GET FiT projects were operational for the entire year. The portfolio of 17 renewable energy projects – comprising solar PV, small hydropower, and bagasse technologies – now has a combined installed capacity of 158 MW, with an estimated annual energy yield of approximately 760 GWh. The actual energy delivered in 2022 was 502 GWh, however, for several operational reasons. Deemed energy - energy that could not be delivered due to grid constraints - accounted for approximately 91 GWh. The remaining difference between the estimated and actual annual generation in 2022 can be attributed to low sugarcane availability at the bagasse plant, as well as the below average hydrological year experienced by several of the small hydropower plants.

Contributing to an improved private sector investment environment. Besides enabling the implementation of 17 small-scale renewable energy projects by private developers, GET FiT has further assisted authorities in the energy sector via several Technical Assistance activities over the years, contributing to a transparent and robust regulatory framework. In that respect, the Ugandan Energy Regulatory Authority (ERA) has been ranked to have the best regulatory framework in Africa for five consecutive years in the Africa Electricity Regulatory Index, a strong indicator of a favourable investment environment.

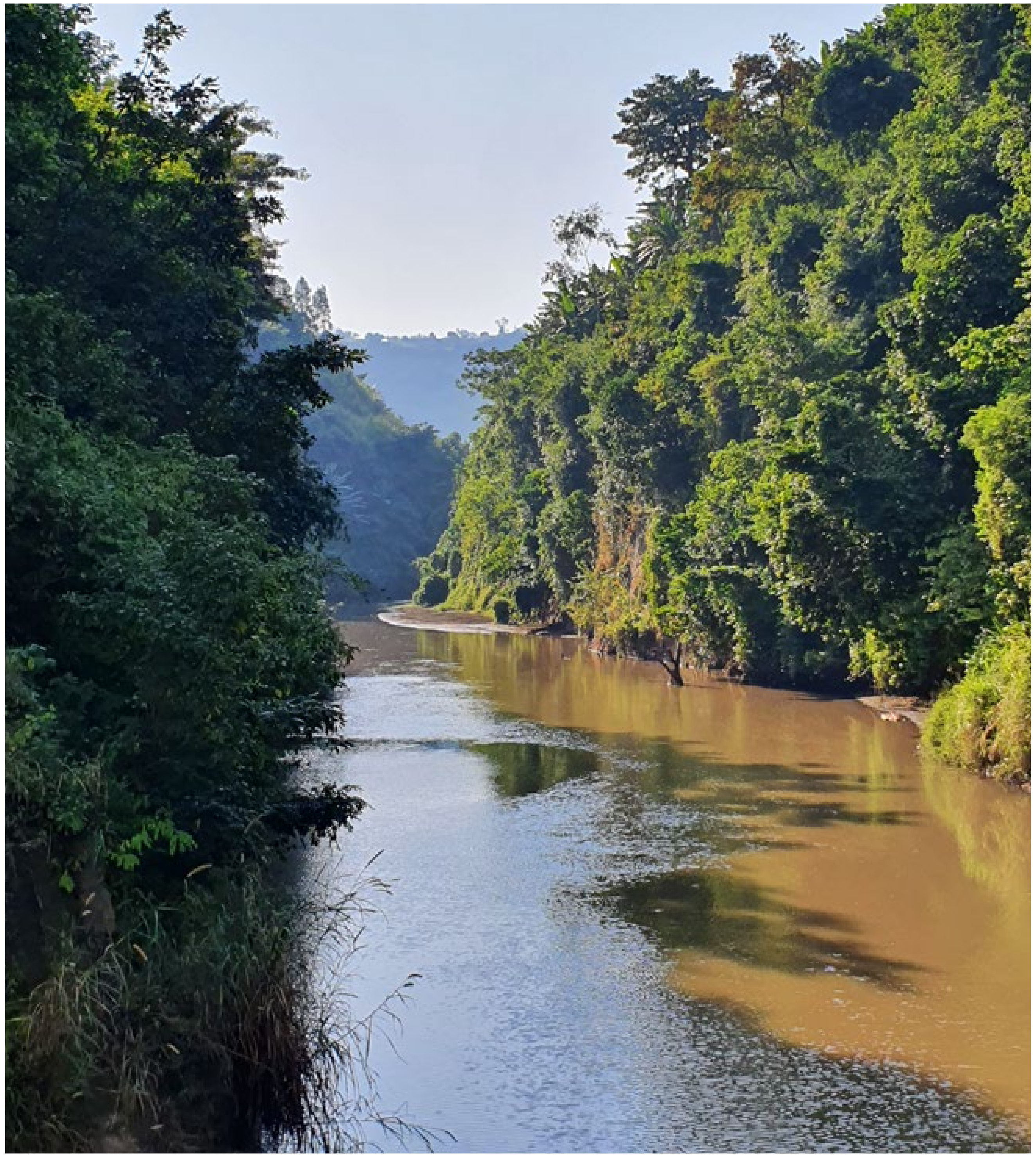
Creating jobs, reducing emissions and diversifying the country's power supply. By the end of 2022, more than 13,500 FTEs were employed in Uganda, more than three times the target, with the majority of FTEs being Ugandan nationals. Generation from the renewable energy projects has furthermore avoided the release of approximately 1.4 million tons of CO_2e from alternative power generation sources. With projects spread across four different regions in Uganda and three different generation technologies, the GET FiT portfolio has further contributed to the diversification and resilience of the country's power supply.

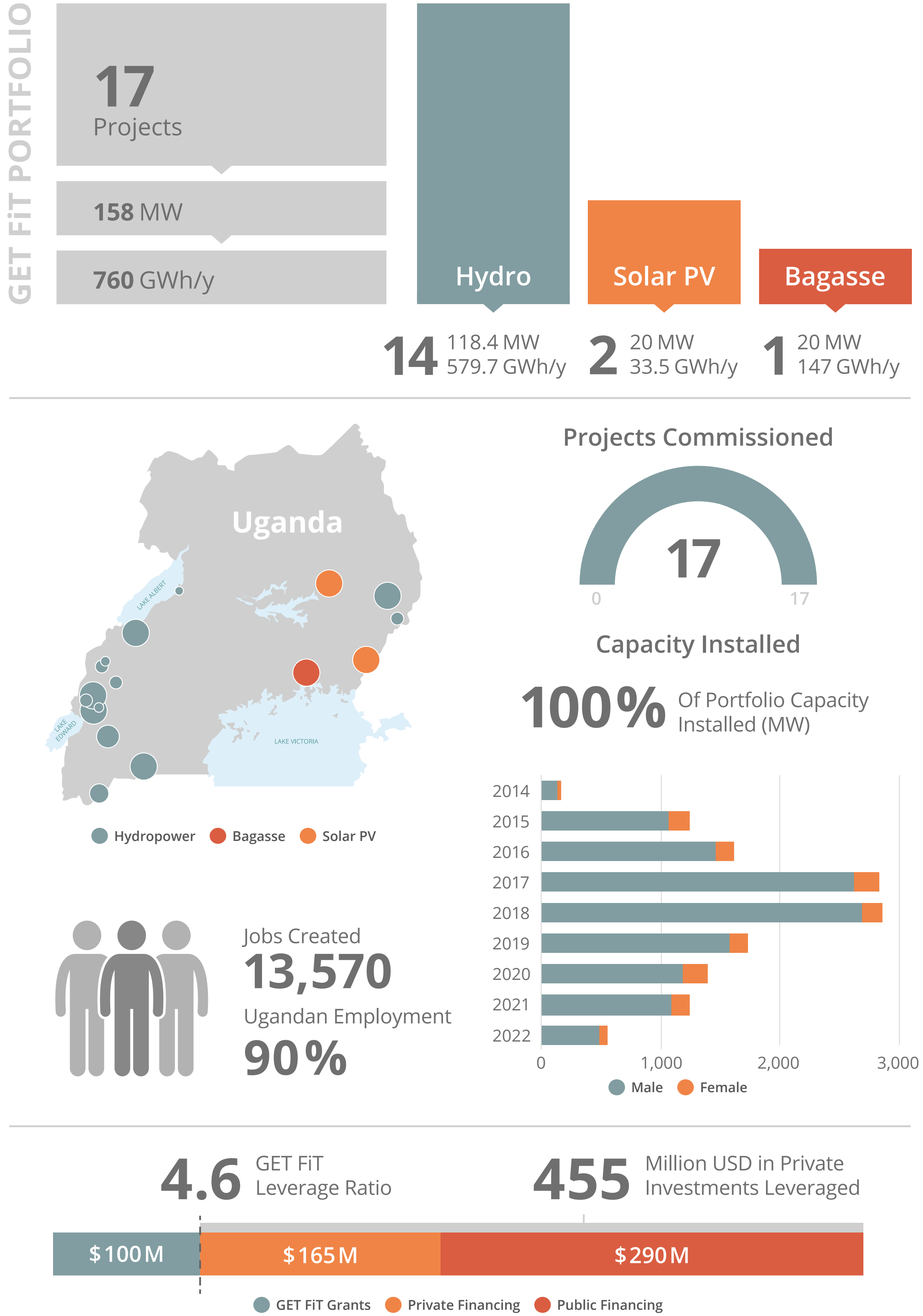
Continued challenges in power evacuation. Power evacuation remains a challenge for a number of projects, resulting in continued high deemed energy. Whilst improvements to the evacuation infrastructure in 2022 benefited several projects, evacuation challenges persisted at those projects commissioned in the second half of 2021. As a result, deemed energy equated to approximately 15% of the total annual generation potential in 2022.

Gradual progress on implementing the Interconnection Component. To address evacuation challenges and strengthen the grid, GET FiT is providing further support through a separate Interconnection Component in Western Uganda. This further intervention will benefit several GET FiT projects as well as other generation projects in the region and is expected to substantially reduce deemed energy liabilities for the Government of Uganda (GoU). Implementation delays have persisted since 2018, however, and further dedicated efforts during 2022 were required to resolve key stakeholder issues and prioritise the intervention. Construction is now scheduled to commence in mid-2023, with an estimated 6-8 months duration to complete.

Environmental and social performance as a key focus. Environmental and social performance has been a focus area for GET FiT since the inception of the Programme, throughout the development and construction phases of the projects and now during the operating phase. Monitoring has particularly focused on checking compliance with Ugandan regulations and the environmental and social performance standards (PS) of the International Finance Corporation (IFC). Following up closely in this area has been important, with several environmental and social issues requiring particular attention throughout the implementation phase. Fish migration challenges continued to be a key focus at two GET FiT supported projects during 2022 and will require continued follow-up in the coming year.

Outlook for 2023. The Programme has fulfilled many of its initial targets since 2013, and most activities are now already concluded. Several challenges and activities remain, however, which will require continued efforts in 2023 and beyond. These include completing the permanent power evacuation solutions for several of the small hydropower projects, as well as follow-up of the latest commissioned projects to ensure compliance with GET FiT Programme requirements. It is furthermore expected that implementation of the Regulatory Information Management System (RIMS) at ERA and the Environmental Flow Working Group activities will be concluded by the end of the year. To the extent that budget and timelines allow for it, the implementation of additional measures is considered to further round up the Programme.





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List of Abbreviations

BEIS	Department for Business, Energy & Industrial Strategy, UK
CO_2	Carbon Dioxide
CHP	Combined Heat and Power Plant or Cogeneration Plant
COD	Commercial Operation Date
BEIS	Department for Business, Energy & Industrial Strategy, UK
DFA	Developer Financing Agreement
DFID	Department for International Development, UK, now the Foreign, Commonwealth & Development Office
DWRM	Directorate of Water Resources Management
EPC	Engineering, Procurement and Construction (a form of contract)
ERA	Electricity Regulatory Authority
E&S	Environmental and Social
EU ITF	European Union Infrastructure Trust Fund
FCDO	Foreign, Commonwealth & Development Office, UK
FiT	Feed-in Tariff
FTE	Full Time Equivalent
GHG	Greenhouse Gas
GoU	Government of Uganda
GWh	Gigawatt Hours
IFC PS	International Finance Corporation Performance Standards
IPP	Independent Power Producer
kV	Kilovolt
kWh	Kilowatt hours
Logframe	Logical Framework
MEMD	Ministry of Energy and Mineral Development
$MtCO_2e$	Million Tonnes of Carbon Dioxide Equivalent
MW	Megawatts (of installed power capacity), 1 MW = 1000 kilowatts
MWh	Megawatt hours
NEMA	National Environment Management Authority
O&M	Operations and Maintenance
PPA	Power Purchase Agreement
RIMS	Regulatory Information Management Systems
RE	Renewable Energy
REA	Rural Electrification Agency
SC	Steering Committee
SHP	Small Hydropower Plant
TA	Technical Assistance
TWh	Terrawatt hours
UAT	User Acceptance Test
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited

01 About GET FiT Uganda

The GET FiT Uganda Programme was officially launched on May 31st, 2013. The Programme, which was developed by the Government of Uganda (GoU) and the Electricity Regulatory Authority (ERA), in close cooperation with KfW Development Bank, is designed to leverage private investments into renewable energy generation projects in Uganda. GET FiT is supported by the Governments of Norway, the United Kingdom, Germany and the European Union (EU) through the EU Africa Infrastructure Fund.

The main objective of the GET FiT Programme is to assist Uganda in pursuing a climate resilient low-carbon development path resulting in growth, poverty reduction and climate change mitigation by facilitating private sector involvement and improving the framework conditions for private investments in renewable energy. The GET FiT Uganda objectives include fast-tracking a portfolio of 17 small-scale renewable energy (RE) projects, promoted by private developers, with a total installed capacity of 158 MW. This yields approximately 760 GWh of clean energy production per year, transforming Uganda's energy mix and resulting in:

- Emission reductions of roughly 10 million tonnes of CO_2 during the 20-year lifespan of the Power Purchase Agreements (PPAs).
- An increase in Uganda's energy production by about 20%, and thus a contribution to tackling an anticipated supply shortage.
- Facilitating (or significantly improving) access to energy for at least 200,000 additional households (approximately 1.2 million people) also due to strengthening of regional grids.
- Leveraging more than USD 450 million in public and private investments for RE generation projects with a limited amount of results-based grant funding.

A more comprehensive description of the specific tools and approaches applied by GET FiT to address the challenges faced in the Ugandan power sector, the governance structure of the Programme, and key activities and achievements so far, are presented in the **GET FiT Annual Reports** produced since 2013. Following the success of the Programme in Uganda, the GET FiT concept has been replicated in other countries, with the launch of GET FiT Zambia in 2018 and GET FiT Mozambique in 2022.

GET FiT UGANDA

02 Project Portfolio Status

2.1 Portfolio Status

2.1.1 Overview

All 17 of the small-scale renewable energy projects supported by the GET FiT Programme were connected to the grid by the end of 2021[1], providing a combined installed capacity of 158.4 MW. During 2022 – the first year with all projects fully operational – the portfolio delivered a total of 502 GWh to the grid, corresponding to 9% of the total grid electricity supplied in Uganda. If all deemed energy had also been delivered to the grid, the corresponding numbers would have been approx. 593 GWh.

Despite all projects being operational in 2022, the portfolio generation potential was only at approximately 80 % of the estimated average portfolio generation of 760 GWh per annum. The lower generation potential in 2022 can be predominantly attributed to high planned production from Kakira, which was not achieved due to continuing challenges with an under-supply of sugarcane, as well as lower hydrology for the hydropower plants compared with the estimated average hydrological year. Several hydropower plants also experienced relatively short-lived operational outages due to various reasons, which also contributed to lower overall generation.

By the end of 2022, the GET FiT portfolio had collectively delivered almost 2 TWh to the grid since Programme inception. The portfolio is estimated to have the effect of reducing CO_2 emissions by approximately 10 million tonnes over the 20-year lifespan of the PPAs.

During the preceding two years, 2020 and 2021, the construction and operation of several small hydropower projects (SHPs) had been adversely impacted by the coronavirus pandemic and flooding events – both separately recognised as Force Majeure events. Recovery efforts continued into 2022 and were largely concluded with operating stage impacts in 2022 substantially reduced compared with previous years.

Several challenges still remain to be addressed in 2023 and beyond, including, critically, completing the long-awaited permanent power evacuation solutions for several of the SHPs, as well as follow-up of recently commissioned projects to ensure compliance with GET FiT Programme requirements.

2.1.2 Completion of May 2020 Flood Recovery Efforts

The four SHPs affected by the May 2020 floods – the Nyamagasani 1 and 2, Nyamwamba, and Lubilia SHPs – had experienced varying degrees of damage. Recovery efforts enabled already operational projects to recommence operations in 2020, and projects still under constructing to commence commercial operations in 2021. Nevertheless, further construction works were required to preserve the integrity of key project structures in the long term, which were still ongoing entering 2022 as summarised below.

Nyamagasani 1 and 2 SHPs

Critical riverbank erosion protection works were significantly damaged in the 2020 floods and required reconstruction to protect the powerhouses of both plants as well as alongside the reconstructed sections of Nyamagasani 2 SHP upper waterway. These works were completed in 2022, concluding the flood recovery efforts for the Nyamagasani 1 and 2 SHPs.

Nyamwamba SHP

At the Nyamwamba SHP, the May 2020 floods resulted in significant damage to the intake structure and environs. Following the reconstruction of the intake and recommencement of plant operations in 2020, the Developer subsequently embarked on a pro-

[1] An overview of the implementation timescales for each GET FiT supported project, from approval in principle to construction start and commissioning, is provided in the GET FiT 2021 Annual Report – see **GET FiT Annual Reports** for further details.

gramme to minimise the risk of similar damage in future flood events. The Programme included major channel realignment works and construction of a flood diversion wall and riverbank erosion protection works. The designs were concluded by the end of 2021 following a period of extended design optimisation to bring construction costs to acceptable levels. The works were subsequently commenced and completed in 2022.

It was further understood that erosion in the upstream catchment during the May 2020 floods had led to localised slope failures along the riverbanks, resulting in a substantial increase in the nature and volume of suspended sediment transported by the river. The increase in sediments had adversely affected plant operations in 2020 and throughout 2021. Plant operating protocols were subsequently modified to reduce the volumes of sediments entering the project waterway, which continued throughout 2022 and reduced overall generation. The developer also studied possible modifications to sediment capture structures and the procurement of additional equipment to further reduce sediments entering the waterway. Considerations in this regard were still ongoing at the end of 2022.

Lubilia SHP

The May 2020 floods also resulted in damage at the Lubilia SHP intake and riverbank adjacent to the switchyard at the powerhouse. Whilst the riverbank repairs and erosion protection works at the switchyard were completed in 2021, riverbank repairs at the intake and waterway were ongoing, eventually being completed in the first half of 2022. Whilst this largely concluded the flood recovery efforts for the Lubilia SHP, further requirements for additional riverbank erosion protection works upstream of the powerhouse were still being considered at the end of 2022.

2.1.3 Remaining Challenges

The completion of the long-term power evacuation infrastructure for several GET FiT supported SHPs remained a critical outstanding issue in 2022, with completion now expected in 2024. Implementation delays continued to result in substantial deemed energy claims throughout the year, as well as delaying the completion of remaining plant commissioning tests for several SHPs. GET FiT and supporting partners continue to follow up and support the projects in any possible way to ensure completion of the remaining power evacuation infrastructure as quickly as possible, to minimise future deemed energy claims (see Chapter 4 for more details).

Sediment management also continued to remain a challenge for some of the SHPs, with efforts still ongoing at the end of 2022 to either optimise plant operating protocols or to explore adaptations to existing structures. The performance of sediment management facilities at several SHPs is still to be proven heading into 2023.

Lastly, the final three projects in the portfolio that achieved commercial operation in 2021 – the Nyamagasani 1 and 2 and Kikagati SHPs – will also continue to require follow-up during 2023, to ensure that Programme requirements are fulfilled and that procedures and protocols for the operating phase are appropriate. This includes ensuring fish passage and migration as well as community health and safety at some of the projects.

2.1.4 Consequences of Achieving Delayed Commerical Operation

It was previously determined by the GET FiT Steering Committee (SC) in 2019 that projects achieving their Commercial Operation Date (COD) beyond the extended GET FiT Programme deadline of 31 October 2019[2] would remain eligible for GET FiT support, though the subsidy would be reduced for each full month of delay beyond the deadline[3]. It was further determined by the SC in 2020 that where there were genuine and justifiable Force Majeure claims arising out of the coronavirus pandemic and extreme flooding events, the projects still under construction beyond the deadline – the Nyamagasani 1 and 2 SHPs and the Kikagati SHP – would be eligible for subsidy reduction relief.

The Developers' claims of Force Majeure delays were evaluated by GET FiT in 2021 and early 2022, taking account of legal aspects, a review of construction progress throughout 2020 and 2021, as well as decisions by the Uganda Electricity Transmission Company Limited (UETCL) and ERA with respect to the PPAs. The evaluation concluded in Q1 2022, and an estimated delay duration assigned to each Force Majeure event[4]. The delay duration beyond the Programme deadline was subsequently reduced for each project by an equivalent number of months, and the total subsidy reduction calculated on this basis. For operational projects affected by Force Majeure events during 2020, a delayed submission of annual subsidy claims equivalent to the Force Majeure delay duration was permitted, where such delay duration was justified, in line with an earlier SC determination[4].

Irrespective of the duration of evaluated Force Majeure delays, and whether projects were already operational or were delayed in achieving COD, the cut-off date for final subsidy disbursements made under the GET FiT Premium Payment Mechanism remains as 2023 (2024 for Kikagati).

2.1.5 Power Plant Performance in 2022

Whilst the impacts of the coronavirus pandemic and the 2020 flooding events had largely diminished, several projects still experienced higher than expected internal outages during 2022 due to various reasons. Several of the hydropower projects continued to experience challenges with debris accumulation at waterway intake structures, as well as sediment accumulation, whilst others also experienced small landslides along waterway structures and equipment failures, which resulted in operating downtime. Generation constraints at the Kakira cogeneration plant (CHP) as a result of a low availability of sugar cane continued in 2022 – this is discussed further in Section 2.2.1. Overall, this had the effect of lowering the average plant availability across the portfolio to 96%, which is lower than expected for renewable energy projects of this age[5].

With the completion of long-term power evacuation infrastructure still outstanding for several GET FiT supported projects, grid availability improved in 2022, with an average of approximately 91% across the portfolio, compared with 87% in 2021. Whilst this represents a year-on-year improvement, deemed energy claims as a proportion of the plants' energy potential was approximately 15% in 2022, highlighting the critical nature of completing the new power evacuation lines and upgrades.

The plant and grid availabilities are shown in **Figure 1** below.

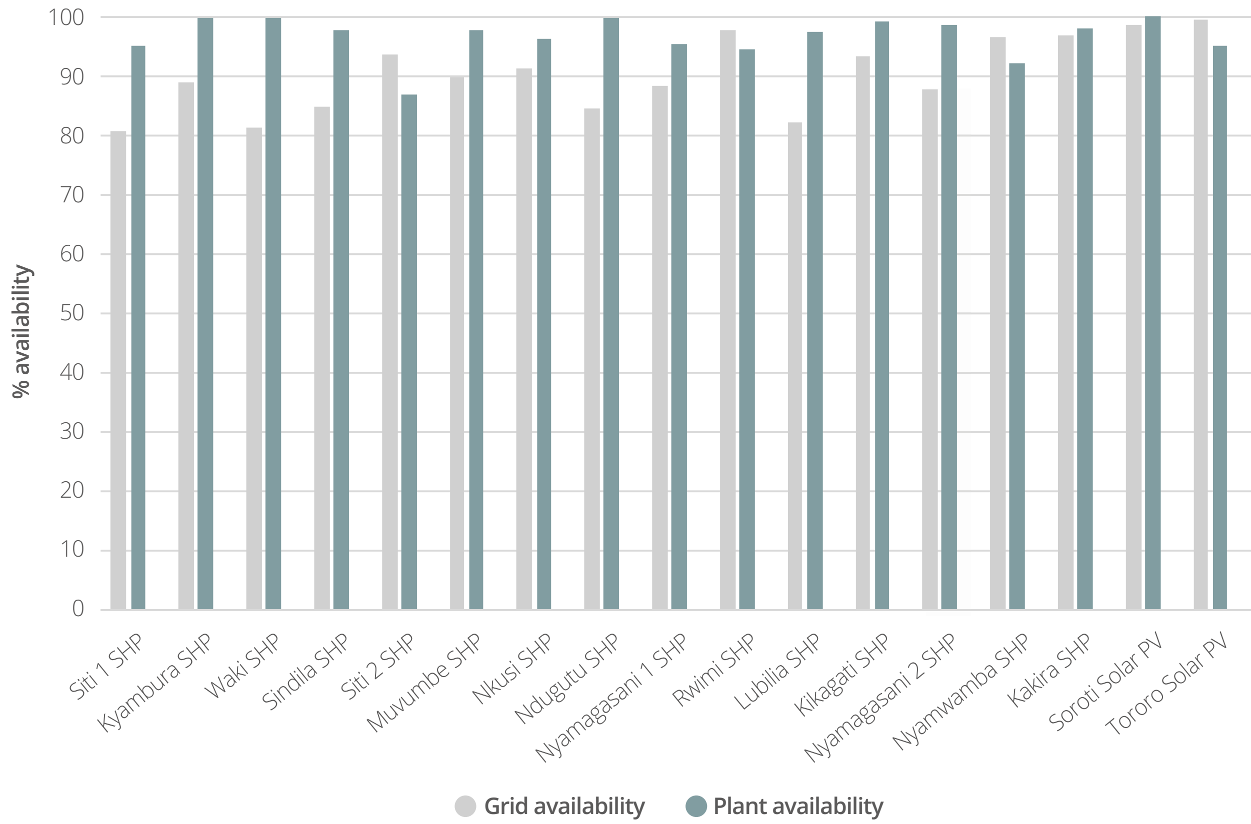


Figure 1 | Grid and plant availability during 2022 for all operational GET FiT supported hydropower projects

[2] The GET FiT Steering Committee resolved in 2018 that, at the discretion of the GoU, represented by KfW, the contractual deadline for all projects still constructing beyond 31 December 2018 would be extended to 31 October 2019. Kikagati received an additional extension until 31 October 2020 due to transboundary issues the project is facing.

[3] Further details are provided in the GET FiT 2021 Annual Report – see **https://www.getfit-uganda.org/annual-reports/** for further details.

[4] Six months being the maximum possible subsidy reduction relief that a Project could be eligible for per Force Majeure event in accordance with the legal interpretation of the DFA.

[5] Due to differences in the reporting of internal outage hours between the projects, the actual average plant availability is likely to be marginally higher than reported.

The energy delivered to the Ugandan grid plus deemed energy by the GET FiT supported hydropower projects during 2022 is summarised in **Figure 2**, below, compared against the average annual generation estimated at GET FiT application stage.[5]

For the SHPs, the generation potential in 2022 was on average 85% of the annual generation estimated at application stage – compared with 120% in 2020 and 94%[6] in 2021 – indicating that 2022 was a below 'average' hydrological year. As in previous years, the Sindila and Ndugutu SHPs, located on the western side of the Rwenzori Mountain range, had a generation potential of only 60% and 84% of expected annual generation, respectively. In the east of Uganda, the Siti 1 and 2 SHPs located on Mount Elgon also had a substantially lower generation potential in 2022 at 67% and 38% respectively, despite previously experiencing generation potential well above the estimated annual generation.

There were, however, several hydropower plants that exceeded their annual generation estimates, demonstrating the potential for wide hydrological variability across the country, as well as the advantage of a distributed power system tending to average out differences in hydrology over the country. Further years of operation will improve certainty with respect to the energy potential of the small hydropower projects compared with the estimates made at application stage.

The total energy delivered across the portfolio (including all 17 projects) during 2022 was 502 GWh, which represents circa 66% of the total planned annual generation at application stage. The total energy delivered per hydropower project is shown in **Figure 3.**

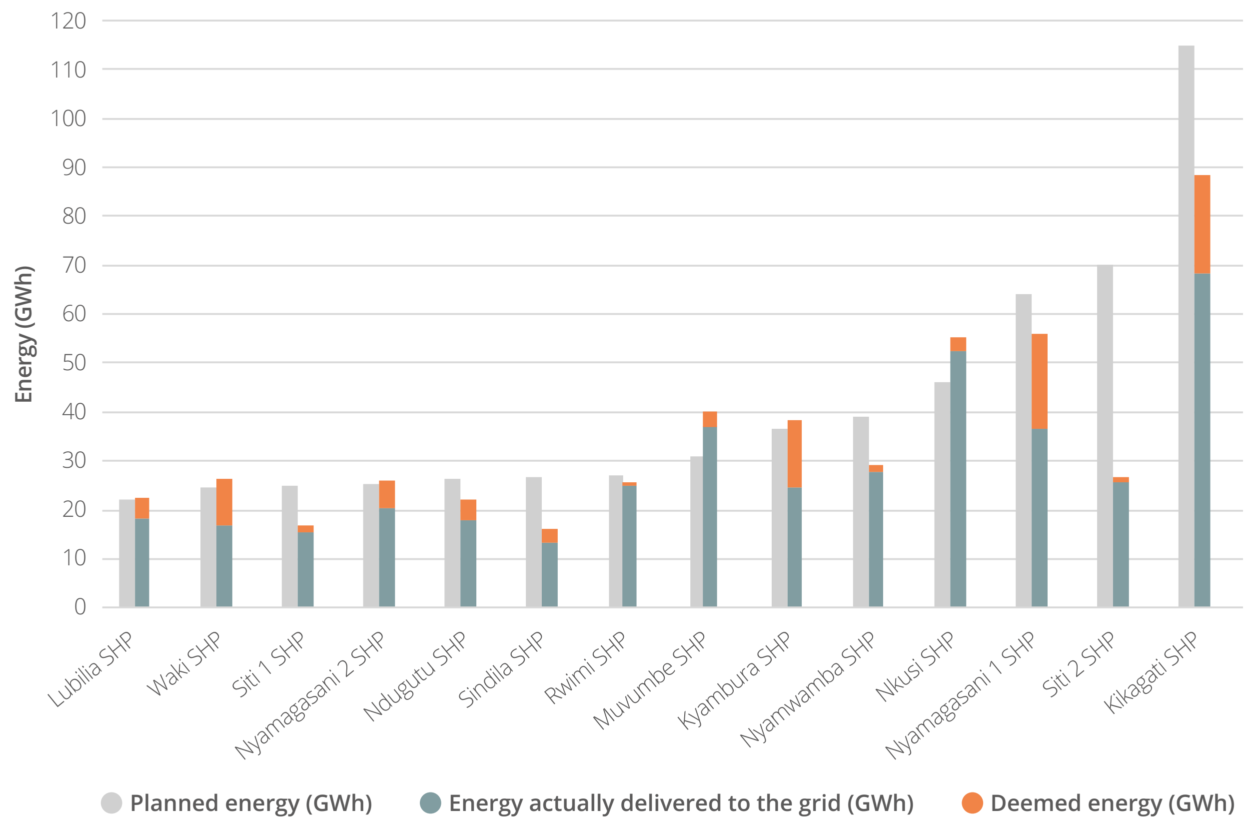


Figure 2 | Planned energy versus energy delivered plus deemed energy during 2022 for all GET FiT supported hydropower projects

[5] The 'potential energy' or 'generation potential' refers to the total energy actually delivered plus deemed to have been delivered, accounting for grid outages. The 'potential energy' therefore reflects water availability during the year compared with the planned annual generation at application stage. Missed generation as a result of internal outages is not included as developers are not paid for such outages under the PPA nor DFA.

[6] The 94% excludes the energy potential of the Nyamwamba and newly commissioned Nyamagasani 1 and 2 and Kikagati SHPs. Energy potential data for the Nyamwamba SHP are incomplete for 2020 due to the damage sustained to project structures as a result of the May 2020 floods. The 94% furthermore includes estimated deemed energy values for the Waki SHP, as deemed energy is still to be reconciled with UETCL for 2020 and 2021.

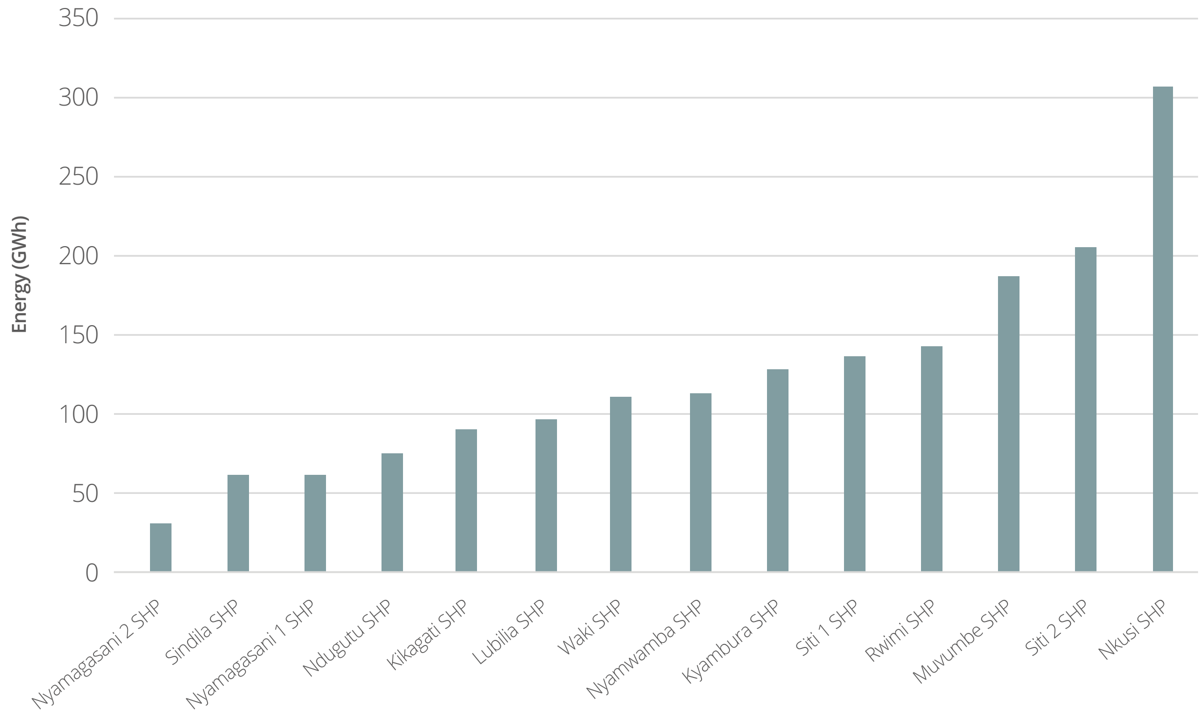


Figure 3 | Cumulative generation from COD until end of 2022 for all GET FiT supported hydropower projects

2.1.6 Expected Portfolio Output

All GET FiT projects are now operational, feeding up to 158.4 MW of electricity to the Ugandan grid with small-scale, geographically distributed energy from three different production technologies. Approximately 75% of the portfolio installed capacity is contributed by 14 hydropower projects, while about 15% of the capacity is coming from two solar projects, and the remaining 10% from bagasse. However, a larger share of the planned electricity generation is coming from bagasse, and an equally smaller fraction from solar due to the difference in capacity factor of these technologies. The total installed capacity is only about 93% of the originally planned capacity of 170 MW, as Programme funding was lacking to award more projects under the Programme, and because the biomass portfolio was smaller than anticipated.

Figure 5 provides a schematic illustration of the merit order effect of the GET FiT portfolio, considering the current installed capacity of 158.4 MW. The merit order effect refers to the reduction of highly priced peak energy that the utility needs to buy. As indicated in the graph, the GET FiT portfolio (green area) can off-set expensive thermal generation (grey area) that is associated with high GHG emissions. The indicative demand curve is based on 2021 figures, as demand data for 2022 was not available at the time of writing this report. Due to GET FiT approximately 22% of total generation capacity from renewable sources has been added, thereby reducing generation from the heavy fuel oil plants in the country. When the 600 MW Karuma Hydropower Project commissions, it is expected that Uganda will face a significant surplus generation capacity compared to demand in the short to medium term.

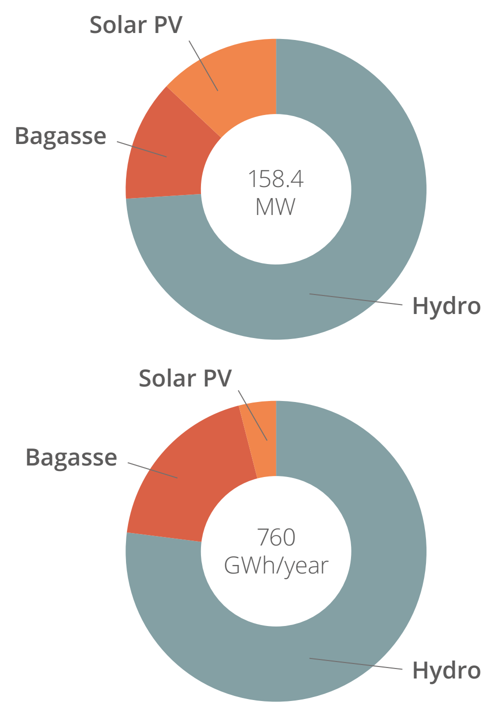


Figure 4 | GET FiT Portfolio composition across technologies

Schematic Representation of Merit Order in 2022

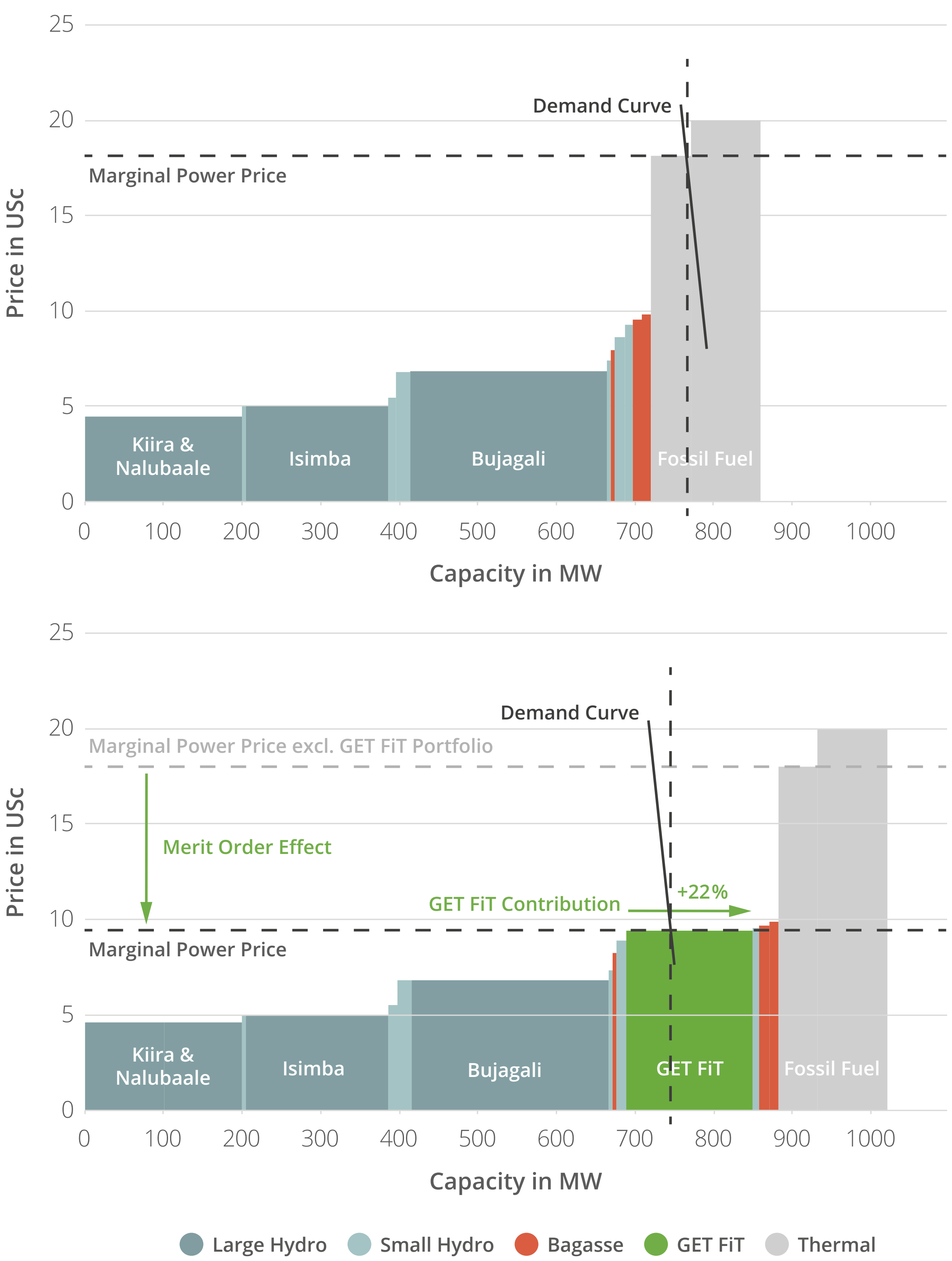


Figure 5 | Schematic Representation of Uganda's Merit Order and the Effect of the GET FiT Portfolio

Note: The merit order effect is expressed in marginal energy price, not average energy price. Both thermal power plants have 7 MW generation guaranteed in their PPA. Additionally, some power plants have take-or-pay PPAs. Therefore, the illustration is only a schematic representation of the effects. The indicative demand curve is based on 2021 figures, as demand data for 2022 was not available at the time of writing this report. Note that a 42 MW hydropower plant has been connected to the grid, but is not included in the Merit Order graph as it did not deliver any energy in 2021, according to statistics. The 22% increase in capacity by GET FiT refers exclusively to the renewable energy capacity. I.e. the energy demand in the country can be 22% higher before the fossil fuelled power plants needs to start generation, compared to a scenario without the GET FiT Portfolio.

2.2 Projects

In the following sections, projects comprising the GET FiT portfolio are described in more detail, highlighting notable developments and power generation[7] in 2022. **Figure 6** provides an overview of the location of the respective projects of the portfolio.

Figure 6 | Map of GET FiT Portfolio

[7] Generation data is presented as provided by the developers. The accuracy and appropriateness of the generation levels presented in the following sections will be reviewed by GET FiT only upon submission of annual subsidy payment requests as per contractually agreed procedures.

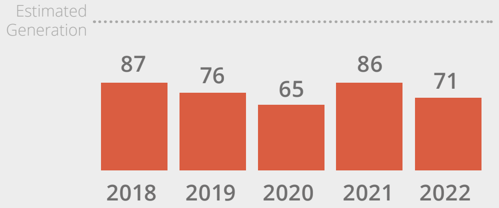
Kakira CHP

Operational

Bagasse

Capacity (in MW)	20.0
Planned Generation (in GWh/year)	147.0
Total Investment (in million USD)	56.8
GET FiT Commitment (in million USD)	7.1

Annual Generation
(in GWh)



The Kakira CHP, located in the Jinja District of Eastern Uganda, was the first operational project supported by GET FiT. The plant uses bagasse from sugar production as feedstock for electricity generation.

In 2022, the Kakira power plant generated 70.7 GWh, a decrease in power generation of 18% compared to 2021, and the plant produced only 41% of planned generation. The reduction in cane supply from outgrower farmers was the primary reason for this decline. The disruption in outgrower cane supply was principally due to competition over sugar cane from multiple sugar factories in the region around Kakira and, to some extent, caused by climatic conditions.

The shortage of cane supply from outgrowers resulted in a reduction in the available bagasse to generate adequate steam for electricity generation. However, grid availability increased from 92% in 2021 to 97% in 2022. Additionally, there was a large reduction of over 60% in unplanned internal outages. In 2021, the project experienced multiple internal outages, reaching a peak in November and December due to a rotor replacement. Conversely, there was an all-time low scheduled maintenance in 2022, totaling 160 hours. This can be seen from the improvement in plant availability, from 87 percent in 2021 to 98 percent in 2022, meaning that the plant could have produced much more, had the sugar cane supply not been low.

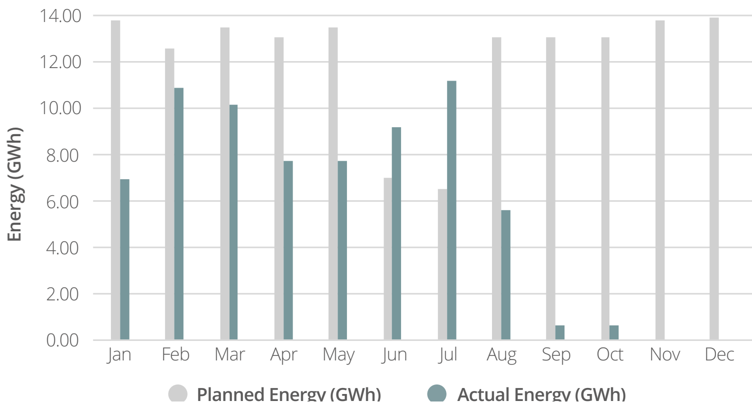


Figure 7 | Kakira Bagasse cogeneration plant – Planned versus Actual Energy Output (2022)

Soroti Solar PV

Operational

The Soroti 10 MWp, Solar PV in the Soroti District in Eastern Uganda, was commissioned in November 2016. It was the second GET FiT supported project to be commissioned, the first grid-connected solar plant in Uganda, and was, at commissioning, the largest project of its kind in the East and Central African Region.

The total generation from the plant in 2022 was 16.2 GWh, comparable with previous years being just above the average of 16.1 GWh from the first six full years of operation (2017 – 2022 inclusive). The plant availability was reportedly 100%, with all planned maintenance activities having been undertaken outside of sunlight hours.

Grid availability was also generally higher than experienced at most other GET FiT supported projects, with an average in 2022 of nearly 99%. This still resulted in nearly 0.5 GWh of deemed energy claims, equivalent to nearly 3% as a proportion of the overall generating potential of the plant. Nevertheless, this represents a year-on-year reduction in deemed energy claims since 2019.

Since commencing commercial operations, the plant has, on average, generated nearly 97% of the estimated annual generation when accounting for grid availability.

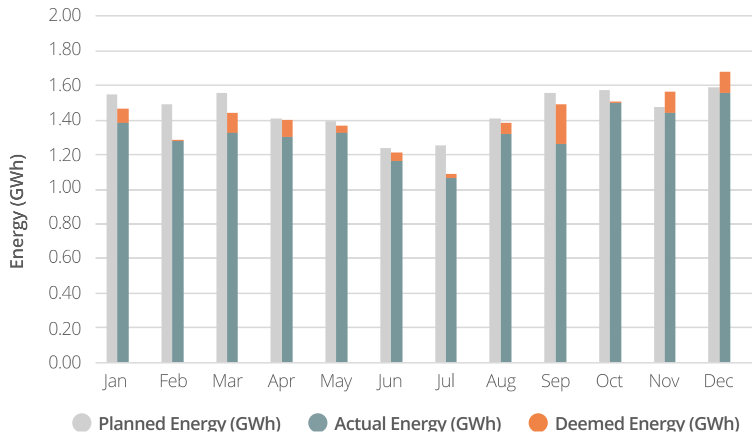
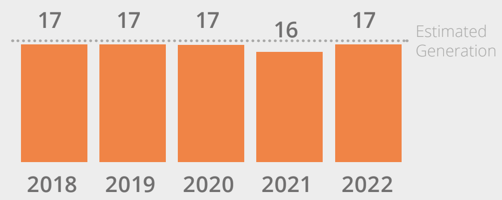


Figure 8 | Soroti Solar PV – Planned versus Actual Energy Output (2022)

Solar PV

Capacity (in MW)	10.0
Planned Generation (in GWh/year)	17.5
Total Investment (in million USD)	14.3
GET FiT Commitment (in million USD)	9.6

Annual Generation
(in GWh)



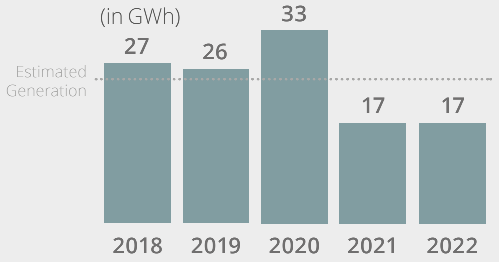
Siti 1 SHP

Operational

Hydropower

Capacity (in MW)	6.1
Planned Generation (in GWh/year)	25.0
Total Investment (in million USD)	15.0
GET FiT Commitment (in million USD)	3.6

Annual Generation (in GWh)



This run-of-river hydropower plant in Bukwo District in Eastern Uganda has been operational since May 2017. During 2022, the project delivered 15.3 GWh of energy to the grid, substantially less than the estimated annual generation, partly resulting from a drier than average hydrological year and continued issues with grid availability.

The plant experienced substantially higher than expected internal outages due to scheduled and unplanned maintenance as a result of equipment failures. This had the effect of reducing plant availability to 95%, which is substantially lower than expected for a plant of this age.

Substantial grid failures and outages continued throughout 2022, with grid availability reportedly as low as 81% on average. Whilst this represented an improvement compared with previous years, lost generation due to grid availability accounted for approximately 9% of the potential annual generation. Adjusting for the partial availability of the power evacuation line as well as internal outages, the energy potential of the plant during 2022 would have been approximately equivalent to 70% of the average annual energy estimated at application stage. This low potential energy production shows that the hydrology was lower than the plant is designed for.

The long-term power evacuation solution for the Siti 1 SHP and downstream Siti 2 SHP, which comprises a new 132 kV transmission line between Mbale and Bulambuli, is expected to substantially improve the availability and reliability of power evacuation from the two plants. The timeline for completing the permanent evacuation solution is currently unclear.

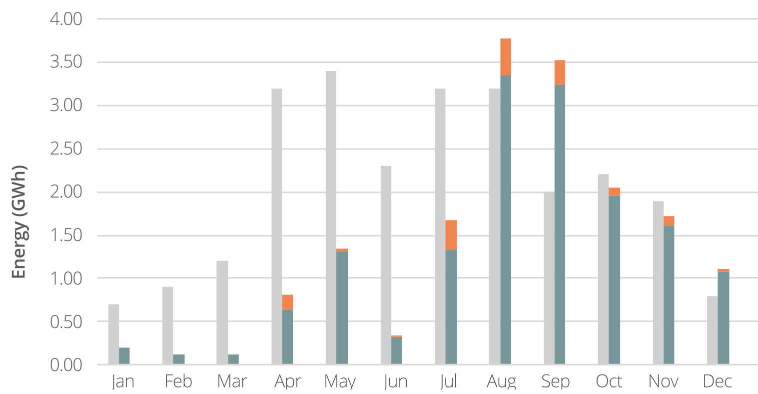


Figure 9 | Siti 1 SHP – Planned versus Actual Energy Output (2022)

Muvumbe SHP

Operational

This run-of-river hydropower project in Kabale District in South-Western Uganda has been operational since May 2017.

In 2022, the Project generated 36.8 GWh. Combined with the energy generated since achieving commercial operation, the Project has contributed more than 170 GWh of electricity to the Ugandan grid – the second highest in the portfolio. Nevertheless, the plant has continued to experience ongoing issues with higher-than-expected suspended sediments passing through the waterway and generating units. In 2022, scheduled and unplanned maintenance, which included replacing equipment due to sediment impacts as well as other non-sediment related issues, resulted in a plant availability less than 98%, which is lower than expected.

Grid availability was approximately 94% on average during 2022, broadly consistent with the average grid availability since the plant achieved commercial operation. This resulted in deemed energy claims as a proportion of the plant's energy potential of nearly 9%.

Adjusting for the partial grid availability and internal outages, the cumulative plant generation would instead have been 40.8 GWh, approximately equivalent to 130% of the average energy estimated at the application stage.

Since commencing commercial operations, the plant has, on average, generated more than 111% of the estimated annual generation when accounting for grid availability and is one of the best performing plants in the portfolio.

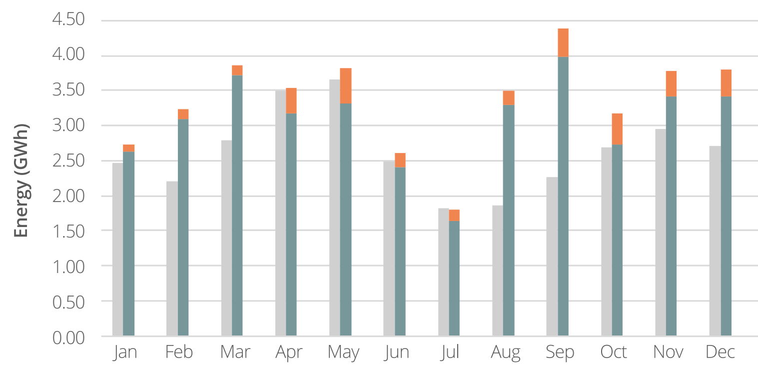
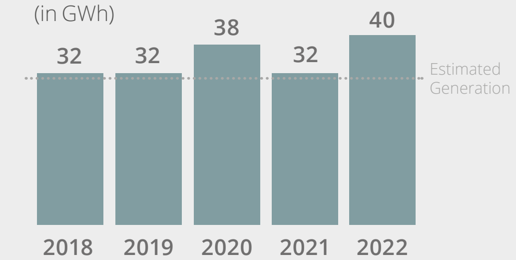


Figure 10 | Muvumbe SHP – Planned versus Actual Energy Output (2022)

Hydropower

Capacity (in MW)	6.5
Planned Generation (in GWh/year)	31.0
Total Investment (in million USD)	12.5
GET FiT Commitment (in million USD)	4.5

Annual Generation (in GWh)



Tororo Solar PV

Operational

Solar PV

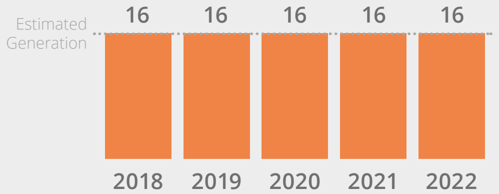
Capacity (in MW) — 10.0

Planned Generation (in GWh/year) — 16.0

Total Investment (in million USD) — 19.6

GET FiT Commitment (in million USD) — 8.0

Annual Generation (in GWh)



The 10 MWp Tororo Solar PV project in Tororo District, Eastern Uganda, commenced commercial operations in September 2017.

The plant generated 15.5 GWh in 2022, comparable with previous years, being just below the average of 15.8 GWh from the first five full years of operation (2018 – 2022 inclusive). The plant availability was nevertheless below expectations at 95% due to unplanned internal outages resulting from corrective maintenance interventions on inverters and not the entire facility. The maintenance required remote intervention from the inverter manufacturer and on-site technicians. Planned maintenance outages were performed after production hours, to avoid interference with production during daytime, thus resulting in no outages due to scheduled maintenance.

Grid availability was very good at nearly 100%, as in previous years, resulting in only minor external outages and less than 1% missed generation as a proportion of the plant's overall generating potential. Accounting for the outages, the plant would have been able to generate 15.7 GWh, approximately equivalent to 101% of the estimated annual generation at application stage.

Since commencing commercial operations, the plant has, on average, generated nearly 103% of the estimated annual generation when accounting for grid availability.

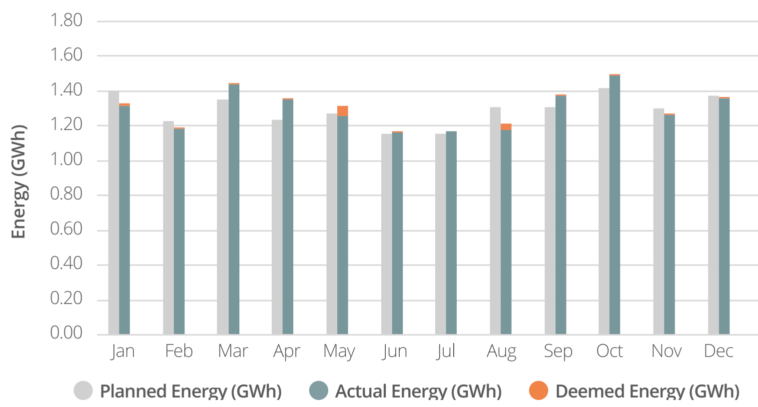


Figure 11 | Tororo Solar PV – Planned versus Actual Energy Output (2022)

Rwimi SHP

Operational

This run-of-river hydropower project in Kasese and Bunyangabo Districts in Western Uganda has been operational since October 2017.

The project generated 24.9 GWh during 2022, despite substantially higher than expected internal outages due to scheduled and unplanned maintenance. Plant availability during 2022 was therefore well below that expected for a plant of this age, at 95%. The plant continued to experience large volumes of accumulated sediments in the reservoir, as was experienced in 2020 and 2021. This resulted in prolonged plant outages in 2022, with sustained efforts required over several days to clear sediments. Combined with planned maintenance activities, this had the effect of reducing the plant availability to just above 97%, lower than expected for a SHP.

Grid availability was, at 98%, better than at any other GET FiT hydropower project, resulting in comparatively low deemed energy claims. Adjusting for the low plant availability and grid outages, the plant would have been able to generate a combined 27.0 GWh during 2022, equivalent to approximately 100% of the estimated annual average energy.

Since commencing commercial operation, the average annual generation is generally in line with the estimated annual energy at application stage, with the plant averaging just over 100% of the estimate per annum when accounting for grid availability.

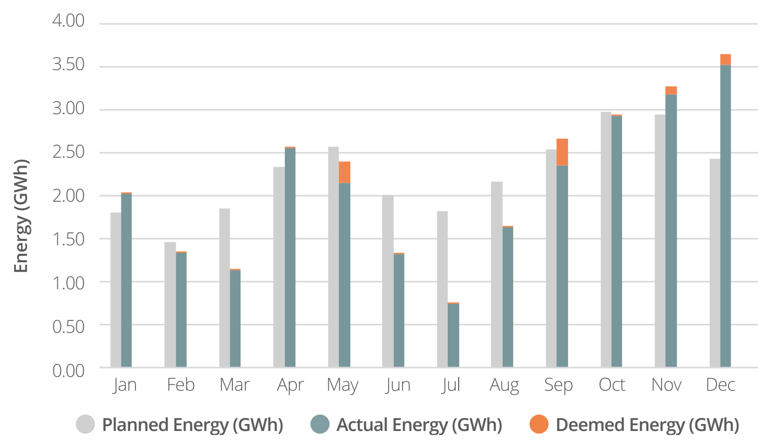


Figure 12 | Rwimi SHP – Planned versus Actual Energy Output (2022)

Hydropower

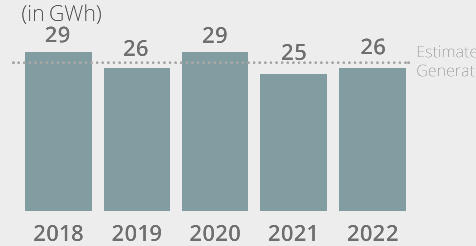
Capacity (in MW) — 5.5

Planned Generation (in GWh/year) — 27.0

Total Investment (in million USD) — 19.9

GET FiT Commitment (in million USD) — 3.9

Annual Generation (in GWh)



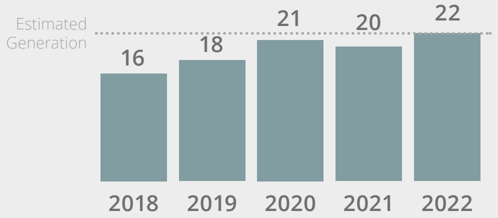
Lubilia SHP

Operational

Hydropower

Capacity (in MW)	5.4
Planned Generation (in GWh/year)	22.0
Total Investment (in million USD)	16.0
GET FiT Commitment (in million USD)	3.2

Annual Generation (in GWh)



This run-of-river hydropower plant in Kasese District in Western Uganda has been operational since early April 2018.

The plant delivered a total of 18.4 GWh of electricity to the Ugandan grid in 2022. The generation was noticeably lower than the planned annual generation as a result of substantial grid availability issues. Internal planned and unplanned outages, as a result of multiple equipment failures and repairs, resulted in an average plant availability for the year of 97.5%, below expectations for a SHP of similar age.

The substantial grid failures and external outages resulted in missed generation approximately equivalent to 19% of the total generation for the year (energy delivered plus deemed energy). Accounting for both internal and external outages, the plant would have instead been able to generate a combined 23.1 GWh during 2022, approximately equivalent to 105% of the estimated annual average energy.

Based on the average annual generation since commencing commercial operation, the actual potential energy of the plant is closer to 93% on average of the annual generation estimated at application stage when accounting for grid availability (excluding the missed generation from prolonged internal outages).

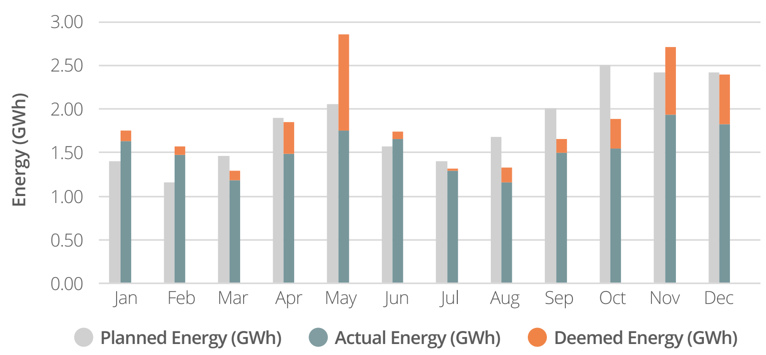
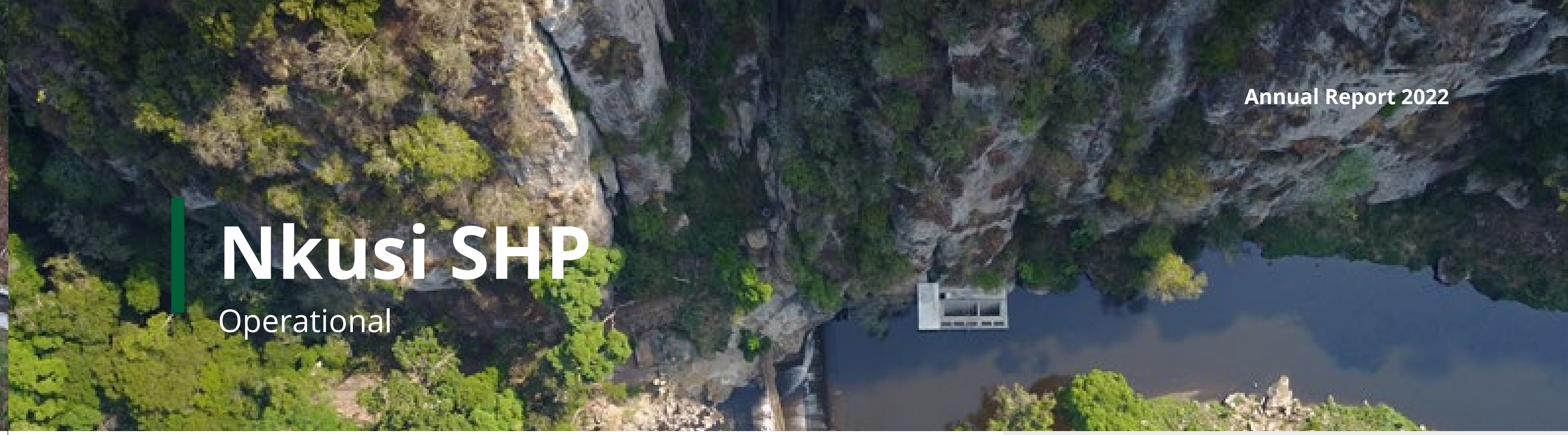


Figure 13 | Lubilia SHP – Planned versus Actual Energy Output (2022)



Nkusi SHP

Operational

This run-of-river hydropower plant in the Kibaale and Hoima Districts in Western Uganda has been operational since June 2018. The Project generated 52.4 GWh during 2022. Since achieving commercial operation, the Project has contributed more than 300 GWh of electricity to the Ugandan grid – the largest contribution from a single project within the portfolio. Nevertheless, internal outages during 2022 due to scheduled and unplanned maintenance – predominantly resulting from modifications to existing structures to improve plant performance – were higher than expected for a plant of this age, with plant availability as low as 96%.

Whilst grid failures and external outages continued to be an issue in 2022, grid availability had generally steadily improved since the start of commercial operations as a result of several previous interventions. Deemed energy had consequently steadily fallen from nearly 25% in the first full year of operation to approximately 5% in 2022, representing a substantial improvement. Adjusting for external outages, the plant would have been able to generate a combined 55.2 GWh during 2022, approximately equivalent to 120% of the average annual energy estimated at GET FiT application stage. Since commencing commercial operation, the actual energy has consistently been above the estimated generation at application stage, indicating that there is potential for a higher installed capacity at the site.

At application stage, the subsidy commitment for the Project was reduced from 6.7 million USD to 2.8 million USD until sufficient Programme funds were available. Due to the financial status of the Programme, the subsidy commitment for the Project was adjusted to the initial commitment accordingly in 2022.

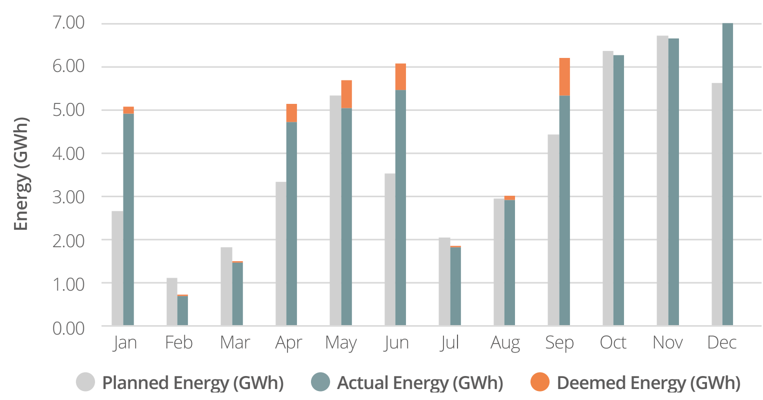
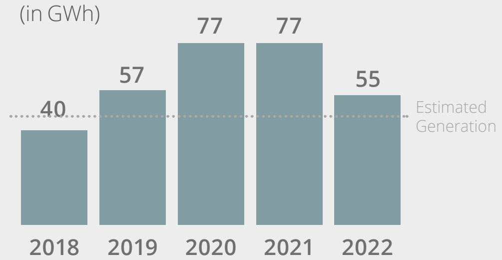


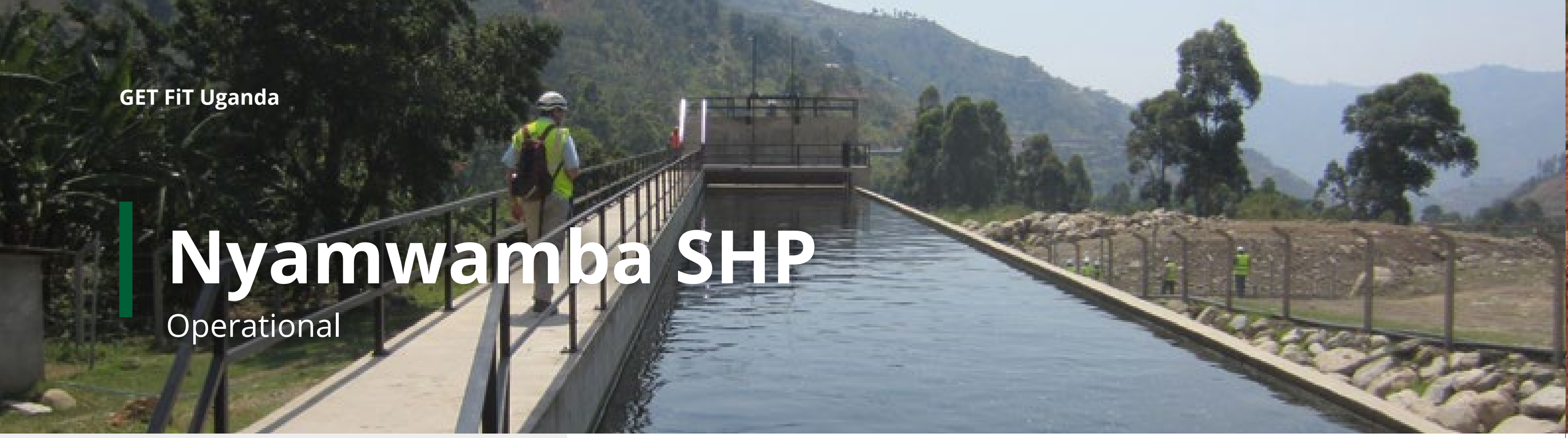
Figure 14 | Nkusi SHP – Planned versus Actual Energy Output (2022)

Hydropower

Capacity (in MW)	9.6
Planned Generation (in GWh/year)	46.0
Total Investment (in million USD)	19.6
GET FiT Commitment (in million USD)	6.7

Annual Generation (in GWh)





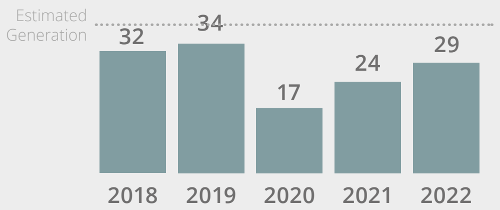
Nyamwamba SHP

Operational

Hydropower

Capacity (in MW)	9.2
Planned Generation (in GWh/year)	39.0
Total Investment (in million USD)	28.7
GET FiT Commitment (in million USD)	5.8

Annual Generation (in GWh)



This run-of-river hydropower plant is located in Kasese District in Western Uganda. The plant achieved commercial operation in April 2018 but sustained substantial damage to key structures in May 2020 as a result of a major flood. The plant was consequently out of operation until October 2020, and not restored to full capacity until June 2021.

In 2022, the plant's first full calendar year of operation since the flood damage, internal outages were higher than expected, with scheduled and unplanned maintenance predominantly a result of ongoing equipment repairs. The plant availability during 2022 was therefore well below that expected for a plant of this age, at 92%.

The May 2020 floods had resulted in a substantial increase in the volume and apparent nature of the suspended sediments transported by the river. As a result, the plant was forced to routinely stop generating to prevent sediments from overwhelming and damaging project structures and equipment. The Developer consequently implemented new physical measures, which were completed in 2022, as well as operational measures to lessen the impacts on generation. The requirement for further measures continues to be studied.

The reported hydrology in 2022 was lower than expected, and only 27.7 GWh of electricity was delivered to the grid. Adjusting for internal and external outages, the plant would have been able to generate a combined 29.3 GWh during 2022, approximately equivalent to 75% of the average annual energy estimated at GET FiT application stage.

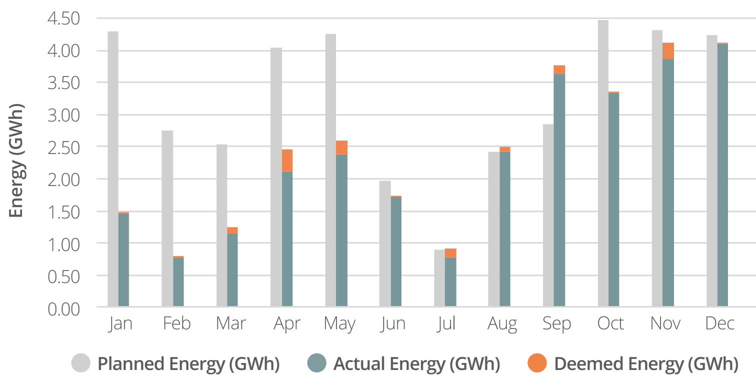


Figure 15 | Nyamwamba SHP – Planned versus Actual Energy Output (2022)

Waki SHP

Operational

This run-of-river hydropower plant in Hoima and Buliisa Districts in Western Uganda has been operational since December 2018. In 2022, the plant delivered 16.7 GWh to the grid, substantially lower than the estimated annual generation.

Grid availability continued to be poor and was 81% on average during 2022, with the plant experiencing more than 100 hours of outage per month on average. The high grid outages and curtailment generally provided the plant operators with sufficient opportunity to undertake maintenance, minimising internal maintenance outages, and plant availability was consequently very good, at close to 100%.

The deemed energy amounts the plant is eligible for between 2020 and 2022 have still not been approved due to ongoing discussions with UETCL regarding the method of measurement. This is expected to be resolved in 2023.

Until the deemed energy quantities for 2019 – 2022 are approved, the energy potential of the plant during these years remains unconfirmed. However, based on available data the plant is expected to have had a generation potential during 2022 of 107%[8] compared with the estimated annual generation, of which 36% was estimated to be deemed energy. Accounting for deemed energy, the plant has had an average annual generation potential since COD of more than 122%.

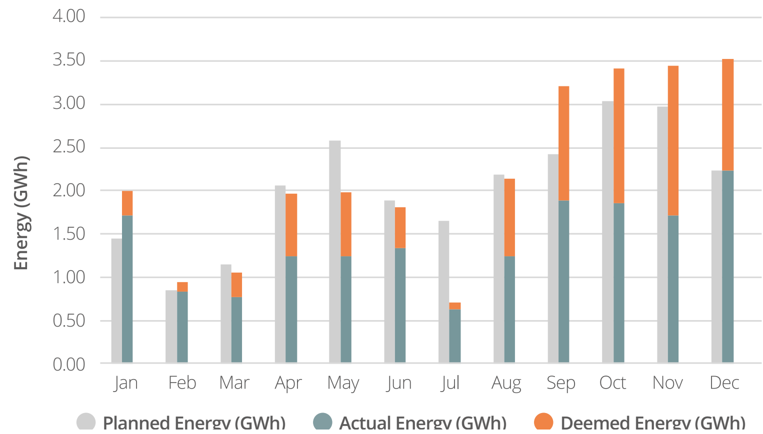


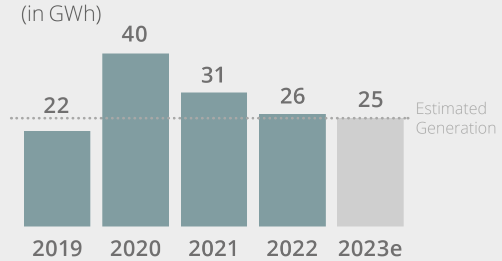
Figure 16 | Waki SHP – Planned versus Actual Energy Output (2022)

[8] Preliminary estimates based on claimed deemed energy values, which are still to be reconciled with UETCL for 2019 – 2022.

Hydropower

Capacity (in MW)	4.8
Planned Generation (in GWh/year)	25.0
Total Investment (in million USD)	17.3
GET FiT Commitment (in million USD)	3.6

Annual Generation[8] (in GWh)



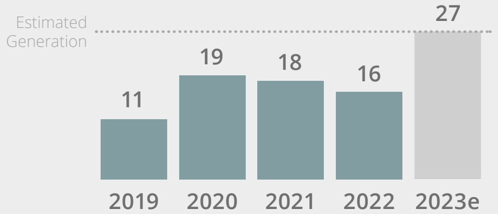
Sindila SHP

Operational

Hydropower

Capacity (in MW)	5.3
Planned Generation (in GWh/year)	27.0
Total Investment (in million USD)	19.4
GET FiT Commitment (in million USD)	3.9

Annual Generation (in GWh)



The Sindila run-of river hydropower plant in Western Uganda was developed in parallel with the Ndugutu SHP and commenced commercial operations in May 2019. The plant delivered 13.5 GWh to the grid in 2022. Due to ongoing hydrology and grid constraints, however, the full suite of commissioning tests have still to be completed.

The grid availability in 2022 was 85%, resulting in over 100 hours of outages per month on average. Since the start of commercial operations, deemed energy as a result of grid outages and generation curtailment represent 16% of the plant's energy potential. The high grid outages and curtailment generally provided the plant operators with sufficient opportunity to undertake maintenance, minimising internal maintenance outages. However, a slope failure in November 2022 caused damage to the headrace pipeline, rendering the plant inoperable until temporary repairs could be carried out. Permanent repairs are planned for 2023.

Adjusting for outages, the plant could have generated 16.4 GWh in 2022, equivalent to 62% of the estimated annual energy at application stage. This is comparable with the average energy from the first three full calendar years of operation of 65%, indicating that the hydrological basis for the plant may be lower than expected.

Construction of a new power evacuation line from Bundibugyo to the Fort Portal substation, along with grid reinforcements, is expected to reduce outages and enable both the Sindila and adjacent Ndugutu SHPs to generate at full capacity. Construction is set to begin in mid 2023.

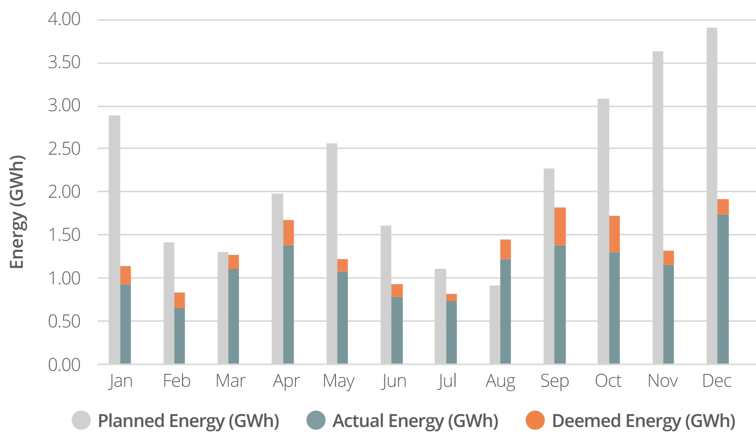


Figure 17 | Sindila SHP – Planned versus Actual Energy Output (2022)

Siti 2 SHP

Operational

The Siti 2 hydropower plant is located in Bukwo District, Eastern Uganda, and has been operational since July 2019. In 2022, the plant generated 25.6 GWh of energy, which was lower than the estimated annual generation due to a drier hydrological year and high internal outages.

Modifications to the existing project structures for safety requirements resulted in substantially higher than expected scheduled and unplanned maintenance, reducing the plant's availability to 87% - the lowest in the portfolio in 2022 - and missed generation equivalent to more than 20% of the annual generating potential.

Despite grid failures and outages, the grid availability improved to 94% on average, partly a reflection of the much lower hydrology, high internal outages, and therefore lower than expected generation – with deemed energy due to grid availability accounting for approximately 3% of the potential annual generation. Adjusting for internal and external outages , the plant's energy potential in 2022 would have been approximately equivalent to 48% of the average annual energy estimated at the application stage. However, the average annual generation during the first three full years of operation was approximately 77%.

A long-term power evacuation solution, which includes a new 132 kV transmission line, is expected to improve availability and reliability power evacuation from the Siti II and Siti I SHPs in the future.

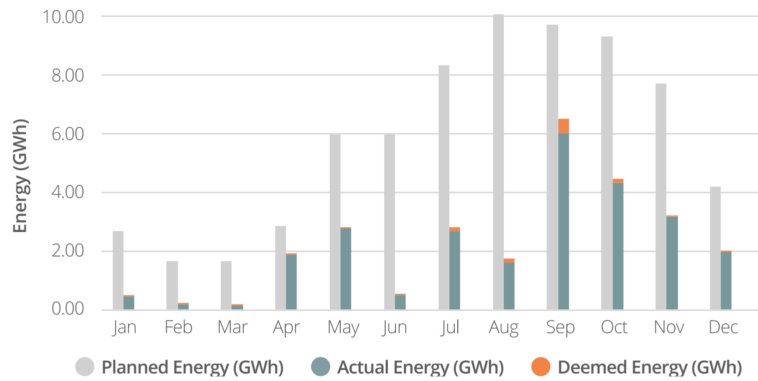
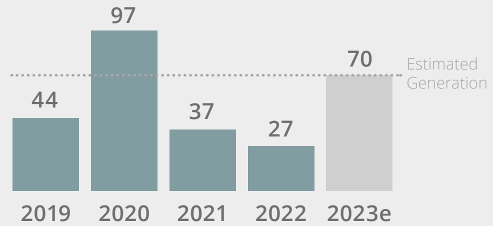


Figure 18 | Siti 2 SHP – Planned versus Actual Energy Output (2022)

Hydropower

Capacity (in MW)	16.5
Planned Generation (in GWh/year)	72.0
Total Investment (in million USD)	33.0
GET FiT Commitment (in million USD)	10.2

Annual Generation (in GWh)



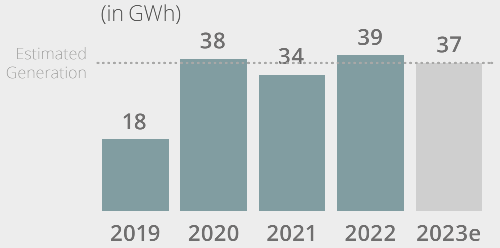
Kyambura SHP

Operational

Hydropower

Capacity (in MW)	7.6
Planned Generation (in GWh/year)	36.7
Total Investment (in million USD)	24.0
GET FiT Commitment (in million USD)	5.4

Annual Generation
(in GWh)



The Kyambura run-of-river hydropower plant, located in the Rubirizi District in Western Uganda, has been operational since July 2019. The plant has been successful in delivering clean electricity to the Ugandan grid, providing 24.7 GWh of electricity in 2022 and more than 100 GWh since its commissioning.

The plant availability remained greater than 99% during 2022, which is in line with expectations for a new SHP. However, the generation at the Kyambura SHP was constrained during the year. The plant output was curtailed at around 5.5 MW due to limited grid capacity in the area, combined with the successful commissioning of a non-GET FiT supported SHP in late Q1 2022.

Since its commercial operation, the Kyambura SHP has achieved an average of just over 100% of the forecast annual energy (delivered plus deemed energy) when accounting for grid availability. The generation losses during 2022 were higher than average for the preceding two full years of operation. Adjusting for the partial availability of the power evacuation line, the cumulative energy output of the plant during 2022 would have been 38.5 GWh, approximately equivalent to 105% of the annual average energy estimated at application stage.

The cause of the fish death in the Kyambura river in February 2021 was not definitively established, but the most likely explanation appears to be inappropriate sediment flushing from the Kyambura SHP dam. Following stakeholder objections to further sediment flushing by the project, a more controlled sediment flushing was finally accepted and undertaken in late 2022. The flushing reportedly took place without any fish death.

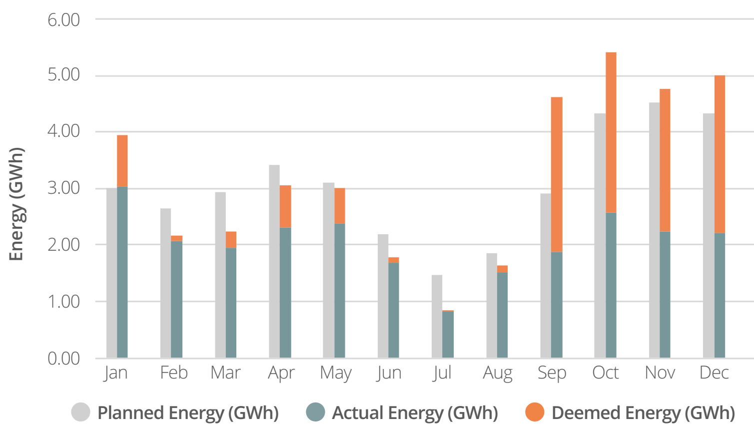


Figure 19 | Kyambura SHP – Planned versus Actual Energy Output (2022)

Ndugutu SHP

Operational

This run-of-river hydropower plant in the Bundibugyo District in Western Uganda was developed in parallel with the Sindila SHP, located on an adjacent river basin (also supported by GET FiT). Ndugutu SHP delivered 18 GWh to the grid in 2022.

The plant commenced commercial operations in October 2019, but still has outstanding commissioning tests due to a combination of limited available water and grid constraints. Grid availability continued to be poor and was 85% on average during 2022, with the plant experiencing more than 100 hours of outage per month on average. Grid constraints furthermore continued to effectively limit the combined output from the Sindila and adjacent Ndugutu SHPs to a combined 8 MW. Since the start of commercial operations, deemed energy as a result of grid outages and generation curtailment represent nearly 20% of the plant's energy potential.

Adjusting for the partial availability of the power evacuation line, the potential plant generation during 2022 would have been 22.2 GWh, approximately 84% of the estimated average annual energy. This is comparable with the average actual energy from the first two full calendar years of operation of 87%, indicating that the hydrological basis for the plant may be lower than expected, though further years of operation are necessary to draw firm conclusions in this regard.

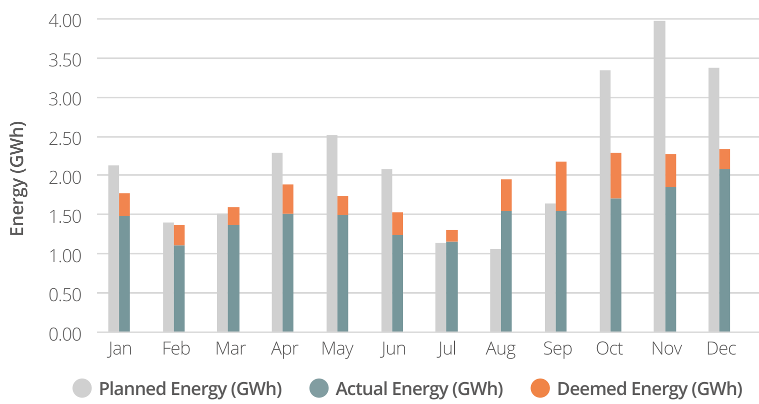
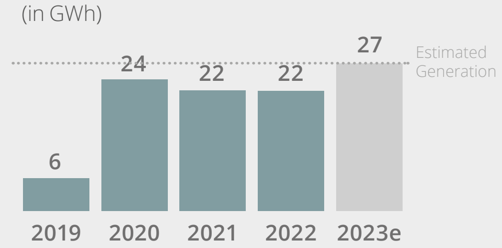


Figure 20 | Ndugutu SHP – Planned versus Actual Energy Output (2022)

Hydropower

Capacity (in MW)	5.9
Planned Generation (in GWh/year)	26.5
Total Investment (in million USD)	17.1
GET FiT Commitment (in million USD)	3.2

Annual Generation
(in GWh)



Nyamagasani 1 SHP

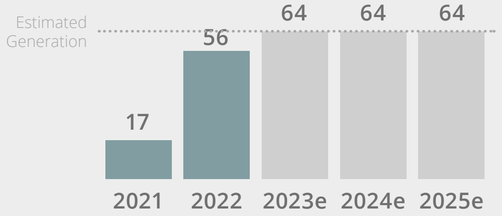
Operational

Hydropower

Capacity (in MW)	15.0
Planned Generation (in GWh/year)	64.0
Total Investment (in million USD)	36.1
GET FiT Commitment (in million USD)	9.3

Annual Generation

(in GWh)



This run-of-river hydropower plant is located in the Kasese District in Western Uganda. The plant commenced commercial operations in August 2021 but has not been able to complete the full suite of commissioning tests due to ongoing grid constraints – refer to Section 4.3 for details.

The Project generated 36.5 GWh during 2022. Despite having only been commissioned in 2021, scheduled and unplanned maintenance were substantially higher than expected for a new hydropower plant, with plant availability as low as 95%.

Grid availability also continued to be poor in 2022 at 85% on average, as a result of the interim connection arrangement, with the plant experiencing more than 100 hours of outage per month on average. Grid constraints furthermore continued to effectively limit the combined output from the GET FiT supported Nyamagasani 1 and 2 SHPs, Kyambura SHP, and Lubilia SHP, with a total combined curtailment limit for all plants of 16 MW. As a result, during the first full year of operation, deemed energy represented nearly 35% of the plant's energy potential.

Adjusting for external outages, the plant would have been able to generate a combined 56.0 GWh during 2022, approximately equivalent to 88% of the average annual energy estimated at GET FiT application stage.

Further follow-up of the plant is required during early 2023 to ensure that GET FiT requirements have been fulfilled, including checking that procedures and protocols for the operating phase are appropriate.

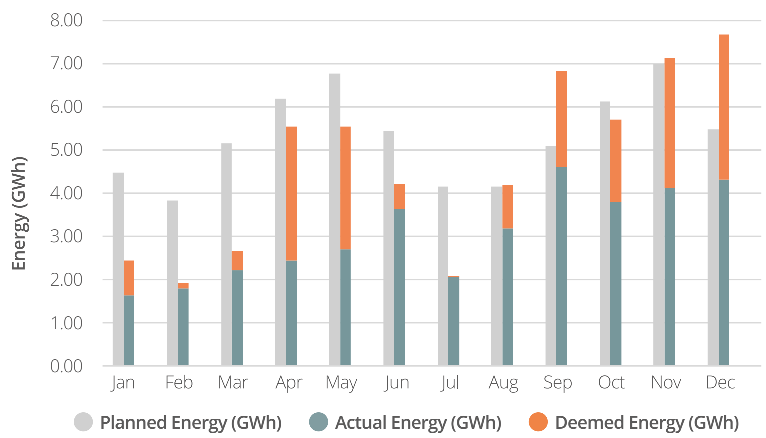


Figure 21 | Nyamagasani 1 SHP – Planned versus Actual Energy Output (2022)

Nyamagasani 2 SHP

Operational

This run-of-river hydropower plant in the Kasese District in Western Uganda was developed as part of a cascade, just downstream of the Nyamagasani 1 SHP – a project also supported by GET FiT and implemented by the same Developer and EPC Contractor team.

The plant commenced commercial operations in February 2021, and in 2022 delivered a total of 20.3 GWh of electricity to the Ugandan grid. Plant availability for the year was 98.5%, which is below expectations for a SHP of similar age, though acceptable.

As for the upstream Nyamagasani 1 SHP, generation in 2022 was noticeably lower than planned as a result of substantial grid constraints and an imposed generation curtailment limit of approximately 3.0 – 3.5 MW. Since the start of commercial operations, deemed energy as a result of grid outages and generation curtailment represent nearly 25% of the plant's energy potential.

Accounting for both internal and external outages, the plant would have been able to generate a combined 26.4 GWh during 2022, approximately equivalent to 104% of the estimated annual average energy.

Further follow-up of the plant is required during 2023 to ensure that GET FiT requirements have been fulfilled, including for safe upstream and downstream fish migration (see Section 3 for more information).

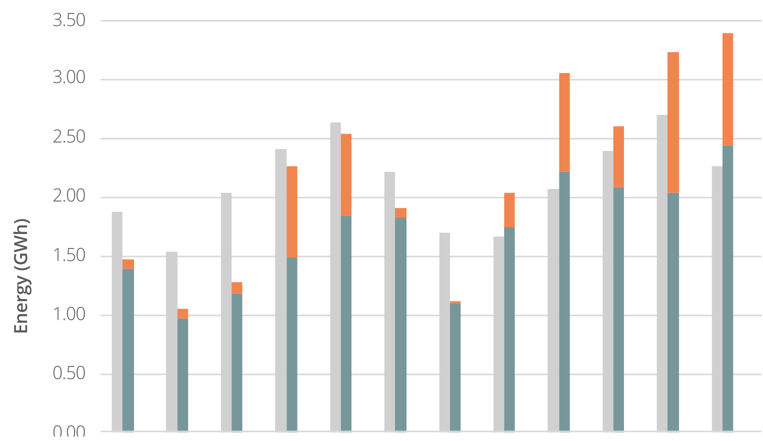


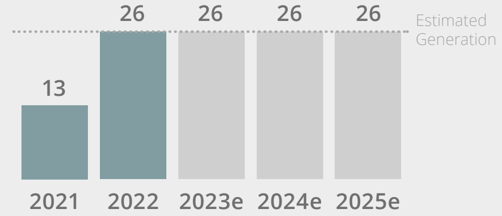
Figure 22 | Nyamagasani 2 SHP – Planned versus Actual Energy Output (2022)

Hydropower

Capacity (in MW)	5.0
Planned Generation (in GWh/year)	25.5
Total Investment (in million USD)	19.4
GET FiT Commitment (in million USD)	3.7

Annual Generation

(in GWh)



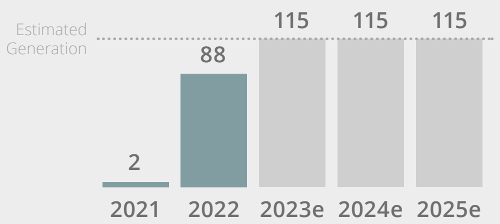
Kikagati SHP

Operational

Hydropower

Capacity (in MW)	16.0
Planned Generation (in GWh/year)	115.0
Total Investment (in million USD)	88.0
GET FiT Commitment (in million USD)	12.3

Annual Generation (in GWh)



The Kikagati-Murongo run-of-river hydropower plant on the Kagera River is located in Isingiro District in South-western Uganda on the border with Kyerwa District in North-Western Tanzania. The plant is unlike all other SHPs in the GET FiT portfolio due to the characteristics of the site with the powerhouse located at the dam. This arrangement results in a minimal waterway length and flows being diverted through the powerhouse and directly into the river downstream of the dam. The dam creates a barrier to upstream fish migration in the largest river flowing into Lake Victoria, and a fish passage is therefore provided to enable ecological connectivity between Lake Victoria and the Kagera River system.

Whilst the plant had been synchronised to the grid and was delivering energy from December 2021, final commissioning tests were not completed until Q1 2022. Deemed Energy was recognised by UETCL thereafter. Nevertheless, the plant delivered 68.45 GWh of electricity to the Ugandan grid in 2022 – one of the single highest annual energy contributions from a GET FiT supported project. Accounting for grid outages, the plant would have been able to generate 88.3 GWh, approximately equivalent to 77% of the average annual energy estimated at GET FiT application stage.

Follow-up of the plant is required in 2023 concerning the long-standing requirements for safe upstream and downstream fish passage and accompanying monitoring and documentation (see Section 3 for more information).

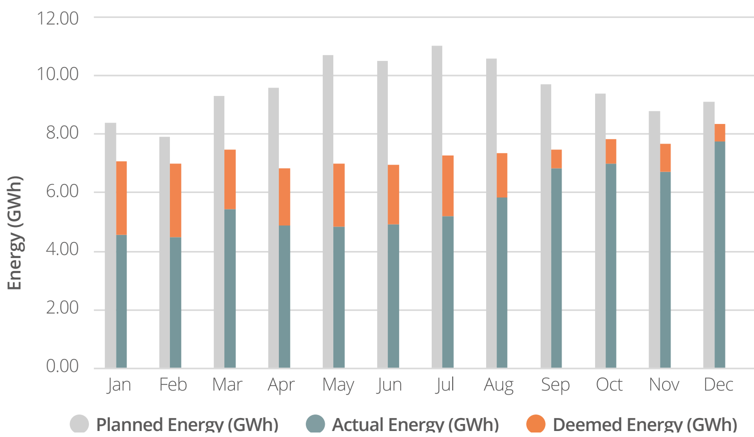


Figure 23 | Kikagati SHP – Planned versus Actual Energy Output (2022)

03 Environmental & Social Performance

3.1 Overall E&S Performance

Projects receiving support from the GET FiT Programme are required to construct, operate and maintain the renewable energy projects in compliance with national environmental and social (E&S) regulations and international standards, including the performance standards (PS) of the International Finance Corporation (IFC). These standards also cover labour and working conditions as well as health and safety of workers, for project-affected people and the local communities. Because the IFC PS act as a global benchmark and is widely applied by international financing institutions and private investors, these standards are a convenient common reference for a multi-donor funded initiative like GET FiT.

The intense construction phase was characterised by many concurrent construction activities, in total thousands of workers across the 17 projects, and at times substantial E&S non-compliances and material risks occurred. All the 17 projects are currently in the operations and maintenance (O&M) phase and deliver power to the national grid. After a number of initial non-compliances and challenges during operations, the O&M phase is currently characterised by fewer ongoing activities, a much smaller number of workers, improved E&S facilities and practices, and overall fewer E&S risks. Some of the main E&S issues and risks currently observed are summarised below.

There were two fatalities reported during operations in 2022, both at hydropower projects. One incident in April 2022 resulted in the tragic loss of a project worker trying to remove accumulated sediments in a sediment flushing pipeline using an unauthorised approach that resulted in the sudden release of high-pressure water and sediments that hit the worker. The second fatality was a member of the public who was intoxicated and subsequently drowned whilst crossing the river in a prohibited area near the project site and being caught by the river currents.

Two hydropower projects have unresolved issues concerning fish migration, specifically developing and implementing procedures that ensure safe upstream and downstream fish migration across the weir. The main risk in both projects is downstream fish migration which can result in excessive fish mortality if fish pass through the intake and turbines due to inadequate mitigation measures. Other projects are required to ensure more responsible management of sediment flushing, which means sediments should be flushed downstream from the dam or weir during high flow periods (rainy season) when the natural sediment load in the river is high and the added burden from a project's sediment flushing is reduced. These measures will assist in safeguarding aquatic biodiversity and people dependent upon fish, other aquatic life and the water resources.

Beyond local communities benefitting from project employment during the O&M phase, they also benefit from projects having constructed local water supply schemes, supporting improved health facilities, improved schools, and other local infrastructure.

3.2 Environmental Flow Working Group

Hydropower projects typically result in a major reduction of the natural river flow between the intake and the powerhouse. For the GET FiT supported projects, this diverted river section is often 3-4 km long but can be more than 5 km. In a cascade of two GET FiT supported projects, a near continuous diverted river section is approximately 10 km where the powerhouse for upper project is very close to the intake of the downstream project and both projects have a diverted section in the range of 5 km. The continuous release of a minimum flow (environmental flow) into the diverted river section to avoid drying out the affected river section is an important and typical mitigation measure to reduce impacts on people and ecosystems along the diverted river section. The volume of the minimum flow also directly impacts on the economic viability of a hydropower project, as water that could otherwise be used for power generation remains in the natural river channel.

Defining, releasing, and monitoring minimum flows have proved problematic to most project developers as reported in previous GET FiT Annual Reports[9]. With all projects in operation, some of them for more than five years, the most serious non-compliances in terms of failure to release the full, continuous minimum flow as required by national requirements have been corrected. Multiple projects have had to retrofit structures to release and monitor the environmental flow in more reliable ways. Several lessons of importance for ecosystems and local communities can be learned from the non-compliances and retrofitting of environmental flow arrangements. Therefore, GET FiT shifted some programme resources towards facilitating an Environmental Flow Working Group in Uganda to analyse and learn from the experiences of GET FiT.

ERA together with GET FiT facilitated the establishment of this Working Group in the second half of 2021. In addition to representatives of ERA and GET FiT, the Group includes representatives from the Ministry of Energy and Mineral Development (MEMD), the Directorate of Water Resources Management (DWRM) in the Ministry of Water and Environment, the National Environment Management Authority (NEMA), the Uganda Electricity Transmission Company Limited (UETCL) which is the offtaker of power from the generation projects, and the Uganda Electricity Generation Company Limited (UEGCL).

The Environmental Flow Working Group also met in 2022, and will meet again in 2023, to review and summarise lessons concerning environmental flows under GET FiT Uganda and propose practical guidance for future handling of such flows. Development of clearer guidance is important as the current lack of clear national requirements or guidelines on environmental flows contributes to the challenges for project developers to study and propose appropriate levels and arrangements for minimum flow to the authorities for their review and potential approval.

Future guidance developed from lessons under GET FiT has the potential to improve clarity, predictability and transparency for all parties involved, including government agencies, hydropower owners and developers, and stakeholders with interests in environmental flows. These lessons and any proposed guidance will also be valuable beyond Uganda.

[9] See for instance the Annual Report for 2017, pp. 49-50 (Section 3.4 Minimum flow – an unresolved issue), or the Annual Report for 2020, pp. 48-49 (Section 3.2 Environmental Flows).

04 Grid Connection Status

4.1 Portfolio Overview of Grid Connection

During 2022, deemed energy[10] claims continued to pose significant challenges across the project portfolio, accounting for 15% of potential annual generation. This is a slight improvement compared to 2021, where deemed energy accounted for approximately 15% of generated electricity. The graph below highlights the actual energy production plotted against the expected or projected energy, and the approved deemed energy claims by project.

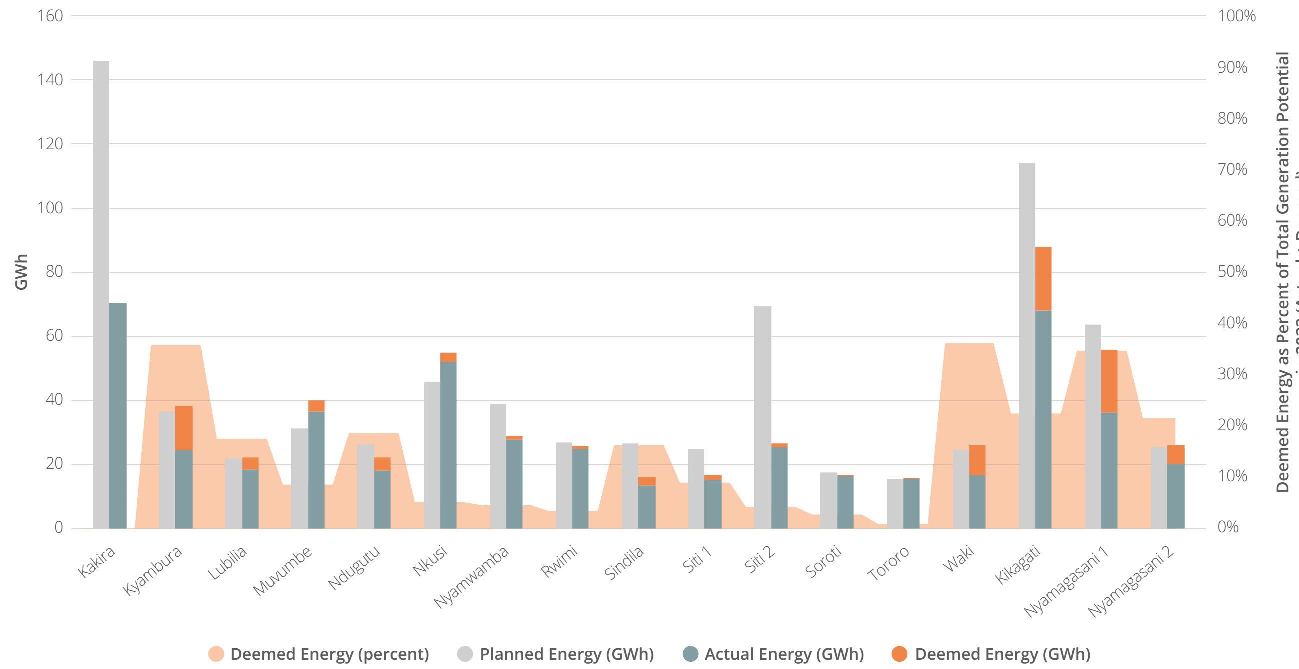


Figure 24 | Planned, Annual and Deemed Energy Generation from GET FiT Projects in 2022

4.2 Project Challenges and Interventions

Waki SHP

The 4.8 MW Waki SHP has been unable to achieve full capacity dispatch since commissioning in December 2018, due to technical constraints on the Uganda Electricity Distribution Company Limited (UEDCL)-operated 33 kV distribution line to Hoima. The project is currently able to dispatch 2.5 to 3.5 MW of its installed capacity when the line is available.

UEDCL has implemented several interventions over the years to improve the performance of the line, leading to gradual improvements in power evacuation. During 2022, the utility replaced 80 rotted wooden poles in critical line sections, cleared overgrown bushes along the line including sections in Budongo forest, installed and connected protection equipment (auto-recloser) to SCADA, and replaced faulty distribution transformers along the line to improve the network reliability.

[10] Energy that a generation facility is prevented from delivering to the offtaker due to grid constraints or limited demand.

Remaining activities include the replacement of over 200 rotten poles, additional bush clearances along the line, and replacement of faulty protection equipment (three load break switches, six dropout fuses, etc.). ERA has approved investments by UEDCL to undertake further necessary network improvements during 2023.

Nkusi SHP

The split of power evacuation at the 9.6 MW Nkusi SHP into two routes, towards Hoima and Fort Portal, respectively, in 2021 reduced technical losses by 50% and led to the lifting of a 6 MW limit on the plant's generation and dispatch. During 2022, practical efforts were continued by UEDCL and the developer to improve the distribution network's performance.

The developer deployed teams to monitor the two evacuation line routes and engage the utility operations teams for the respective routes. This has helped with the timely rectification of outages caused by faults. There are also joint patrols of the lines done by teams from the utilities and developer to oversee necessary line surveys, pole condition and bush clearances. The developer also contributed to the line protection efforts by providing operation sticks to UEDCL offices. The coordinated efforts have resulted in reduced downtime of the line and better reliability, resulting in a significant decrease in deemed energy generation, from 8.44 GWh in 2021 to 2.81 GWh in 2022.

Siti I & II

During 2022, the 6.1 MW Siti 1 and 16.5 MW Siti 2 SHPs were jointly evacuated through the new 125 km 33 kV line from the projects to Mbale which was commissioned in December 2020. Previously, power from Siti I was evacuated through a separate line into the UEDCL distribution network. The evacuation of both plants through the new line reduced the overall deemed energy, but the line losses increased significantly. During the period January to November 2022, over 7 GWh of losses were recorded on the line. The losses would be mitigated in the interim by stringing a second conductor onto the existing evacuation line infrastructure, which was designed for a double circuit, but currently has only one circuit strung. The long-term solution would be the planned construction of the Mbale – Bulambuli 132kV transmission line, which is not expected before 2025.

4.3 Status of GET FiT Interconnection Support

The objective of the GET FiT interconnection component was to reinforce 33 kV distribution grids in Western Uganda to ensure adequate grid integration and power evacuation of five GET FiT projects. The project, initiated in August 2018 with the procurement of EPC contractors, has experienced extensive delays with no construction started since 2018. It is being implemented in two lots: power evacuation of Sindila and Ndugutu SHPs in Bundibugyo district (Lot A - 104 km); and, Nyamagasani 1, Nyamagasani 2 and Lubilia in Kasese district (Lot B – 126km), with a combined capacity of 37 MW.

The project continued to experience delays during 2022, mainly related to the transition of REA into MEMD. Following several engagements between KfW / GET FiT and GoU, it was agreed to accelerate the implementation of the project and have it managed as a priority for the Government. Wayleaves compensation payments for LOT A and LOT B have progressed by the end of December 2022, but additional verification of information for wayleaves compensation payments was still outstanding at the end of the year. Finalization of compensation payments is only expected until mid 2023. Procurement of the design consultant for construction supervision is expected to be completed by the end of April 2023.

The construction works are expected to start by May 2023, with an expected construction period for both lots of 6-8 months. The disbursement period for the project as well as the project completion time have been extended up to 31 December 2023.

05 Technical Assistance

The GET FiT Programme has supported regulatory capacity building initiatives at ERA and other sector agencies through the Technical Assistance (TA) Facility since 2013. A timeline of the TA Facility components and activities is presented on the next page. The Regulatory Information Management Systems (RIMS), whose implementaton status is described below, is the latest component of the TA. Further details of previously implemented TA and its impact on ERA's regulatory function are documented in earlier annual reports available at **https://www.getfit-uganda.org/annual-reports/** and summarized in the figure below.

2013

The GET FiT Secretariat builds competence within ERA:
- Professional twinning: GET FiT Secretariat present in the ERA building. ERA assigned a GET FiT liaison team
- Technical Assistance (TA) Facility procured two of the planned TA components
- Solar Tender Agent: design and implementation of tender, appraisal and selection of solar PV projects
- Due Diligence: optimising and streamlining its technical, environmental and financial/economic project due Diligence for the permit and license application processes

2014

- Due diligence methodology and procedures were developed, training seminar was held and final report delivered by Grontmij
- Solar PV Agent: ERA staff participated in the project site visits and were closely involved in the appraisal
- Tariff modelling: services to train ERA staff in tariff modelling was procured by a consortium led by Frankfurt School-UNEP Collaborating Centre
- Compliance monitoring of transmission and distribution companies- proposal of expanding the DD scope
- Interconnection Code and Standards Wheeling Agreement was proposed as part of the Interconnection component of the TA Facility

2015

- The initial components (solar tender agent, DD) of the TA facility were nearly completed, and new components were introduced as part of the interconnection support
- Inclusion and launch of the Interconnection Component under GET FiT, additional funds were allocated for associated technical assistance
- The consultant for compliance monitoring was under procurement. The scope involved technical assessment of the network and the collection of performance data, as well as developing a compliance monitoring framework

2016

- ERA held a successful two-day GET FiT Forum funded by the TA Facility, with technical workshops administrated by Multiconsult and Investment Committee members
- Revisions of REFiT, conducted by the TA facility and the Frankfurt School
- Approval of new tariffs for the period 2016-2018 to maintain financial viability of future small hydro projects and bagasse
- Two TA components procured consultants: 1) The Interconnection Code and Standards Wheeling Agreement component was awarded Intec GOPA, with the aim of establishing technical requirements for grid connection and defining responsibilities and associated costs for the wheeling of electricity; and 2) Optimisation of Compliance Monitoring of Distribution and Transmission Licensees and Regulatory Capacity Building was awarded Azorom, Fichtner and Kaizen Africa

2017

ERA launched a knowledge transfer programme to institutionalise experience and competence gained throughout the implementation of the GET FiT portfolio. The knowledge transfer and the following grid connection support components were funded by DFID through the grid connection support component:
- Interconnection Code and Wheeling Agreement was concluded in 2017
- Compliance Monitoring of Distribution and Transmission Licensees was still ongoing
- Developed a new technical assistance component to implement a Regulatory Information Management System (RIMS) for ERA

2018

Continuation of the following DFID-funded grid connection support components:
- Compliance Monitoring of Distribution and Transmission Licensees was concluded in 2018 by Azorom with the establishment of licensing and performance monitoring processes for all present and future transmission and distribution licensees
- Regulatory Information Management System (RIMS): The contract for the system design and preparation of tender documents was awarded and the project was started in May 2018

2019

- The implementation of a modern regulatory management system was the remaining component of the DFID funded grid connection support
- The contract for the RIMS design and preparation of tender documents was awarded to Ernst and Young Uganda and the project was started in May 2018
- The Consultant finalised the system design and solution report and the tender for the procurement of the contractor to implement the system was prepared

2020

- The RIMS contract was awarded to a Kenya-based firm in October 2020.
- The contractor kicked off the project in November 2020.

2021

- The procurement of hardware for the ERA data centre was completed in September 2021. Due to the global pandemic, the launch of RIMS was delayed, and system developments were still ongoing.
- By the end of 2021, the overall RIMS project development was at 53 % to implementation completion. ERA successfully solicited additional funding of USD 1.5 million from the World Bank to implement the next phase of the RIMS.

2022

- Further progress was made in the implementation of the RIMS, with Use Acceptance Tests (UAT) expected to conclude in 2023.
- A potential follow-up for the RIMS project, providing a back-up system for ERA, was discussed by the Steering Committee in 2022.

Figure 25 | Timeline of the TA Facility components and activities from 2013-2021

5.1 Implementation of the Regulatory Information Management System (RIMS)

GET FiT support to the ERA RIMS project was aimed at enhancing the efficiency of information collection and data processing activities of the Regulator, automate regulatory analysis and compliance monitoring, and facilitate stronger web-based stakeholder engagements for effective service delivery. The project commenced in 2018, with the procurement of a consultant to develop the system specifications in consultation with ERA. The procurement of a system developer to build the RIMS was completed in 2020.

Status of Implementation

As of March 2023, the overall RIMS Project Development was 59% complete. The RIMS Solution Requirements and Solution Design documents were completed and signed off by ERA in 2022, while there are still outstanding User Acceptance Tests (UAT) of the system at ERA, based on agile testing. The Pre-UAT status was at 53% with 11 Modules above 70% development, 5 Modules between 60%- 70% Development in March 2023. The UAT was expected to be closed by the end of February 2023 but was delayed due to slower progress in the development of the RIMS system.

ERA was conducting the User Acceptance Tests for all the modules that were ready and establishing a defects log of issues to be refined by the contractor. The expected project go-live and execution end dates have been extended from December 2022 to June 2023, in consultation with KfW and ERA.

Key Challenges

The RIMS project implementation has turned out to be significantly more complex than anticipated at inception, in large part due to the depth of processes and systems at ERA. There have been a number of reported defects related to quality control from the contractor, and additional quality control layers have been implemented to ensure that they are jointly identified and quickly addressed.

There has been a lower release of functionality for testing against the project and release plan. This has resulted in failure to meet the threshold for UATs as well as missing the Go-Live date of December 2022. Measures on the project challenges have been adopted including defining a critical path for the project that will be monitored regularly. Additionally, a new project plan has been developed to align with the current effort.

06 Financial Status

6.1 Funding Commitments

During implementation, the GET FiT Uganda Programme has required changes to the portfolio structure and implementation to adapt to the changing sector needs. As GET FiT is a results-based Programme – meaning that subsidies are being paid based on actual delivery of energy – it is dependent on predictable commitments from development partners, and an active follow-up from all stakeholders. Four development partners have taken up the challenge and provided GET FiT with the necessary funding: Government of Norway, Government of UK (through BEIS and FCDO - formerly DFID), Germany (BMZ) and the EU (through EU ITF). About EUR 93.5 million have been committed to the Programme and an overview of the respective commitments can be found in the table below.

Table 1 | Overall Donor Commitments to GET FiT

Donor	Net amount committed (EUR)
Norway	15,592,885
UK BEIS	28,297,496
UK FCDO (formerly UK DFID)	14,129,894
GER BMZ	15,000,000
EU ITF	20,000,000
Total	**93,020,275**

Note: Net amounts are based on funding disbursed to the Programme thus far, current exchange rates for undisbursed funds and deduction of management fees.

The amount available for the Programme to fund subsidies and other project components, is to some extent dependent on the exchange rates between GBP and EUR, as approximately 8% of the total GET FiT budget in the form of 6.5 million GBP is subject to foreign exchange rate risk. While the exchange rate developments in 2021 had a positive impact on the overall budget of GET FiT Uganda – increasing the total net commitments by circa EUR 700,000 compared to 2020 – this has to a large extent been reversed in the course of 2022. A budget buffer is set aside from the committed Programme funds to cushion such fluctuations, and a potential future increase in the EUR/GBP rate. GET FiT frequently monitors exchange rate developments to allow for proactive action if needed.

6.2 Disbursement Projections

GET FiT funds are disbursed for the following three purposes:

- Project grants. 50% is paid at COD and up to 50% is paid in the form of results-based support over the first five years of operation, subject to actual generation
- Consultants under the TA Facility for ERA
- Consultants for the overall management and monitoring of the Programme

The actual Programme disbursements to date and projected disbursements in 2023 and 2024 are illustrated in **Figure 26**. The projections are based on the status of the project portfolio and expected disbursements. Only limited disbursements are planned for 2024, as no project subsidies can be paid out after 2023 (with the exception of Kikagati, which was granted an extension to 2024 due to transboundary issues) regardless of whether the plants have produced for a full 5 years period. The annual subsidy payments and COD premiums in 2023 and 2024 will likely be somewhat lower than projected, due to penalties and deductions that some developers face.

Notably, project construction delays have influenced the originally expected disbursement profile, as this has led to delays in the payment of COD premiums and annual subsidies. For projects that were commissioned after 2018, the total disbursed amount will be lower than what was originally granted due to the subsidy deadline in 2023 and penalties due to non-compliance.

Even though Nyamagasani 1, Nyamagasani 2 and Kikagati were all commissioned during 2021, the projects have not yet received the COD subsidies as of the end of 2022. This is due to ongoing discussions about important project requirements (see Chapter 2). It is expected that the COD subsidy payments will be made during 2023.

The above-mentioned reduction in subsidies implies that there will be remaining funds at the end of the Programme, which can be disbursed to other project activities. It has been agreed with donors that excess funding may be allocated to the interconnection component that is supported by GET FiT[11]. Further, there are ongoing discussions to undertake TA activities and publish accompanying lessons learned brochures.

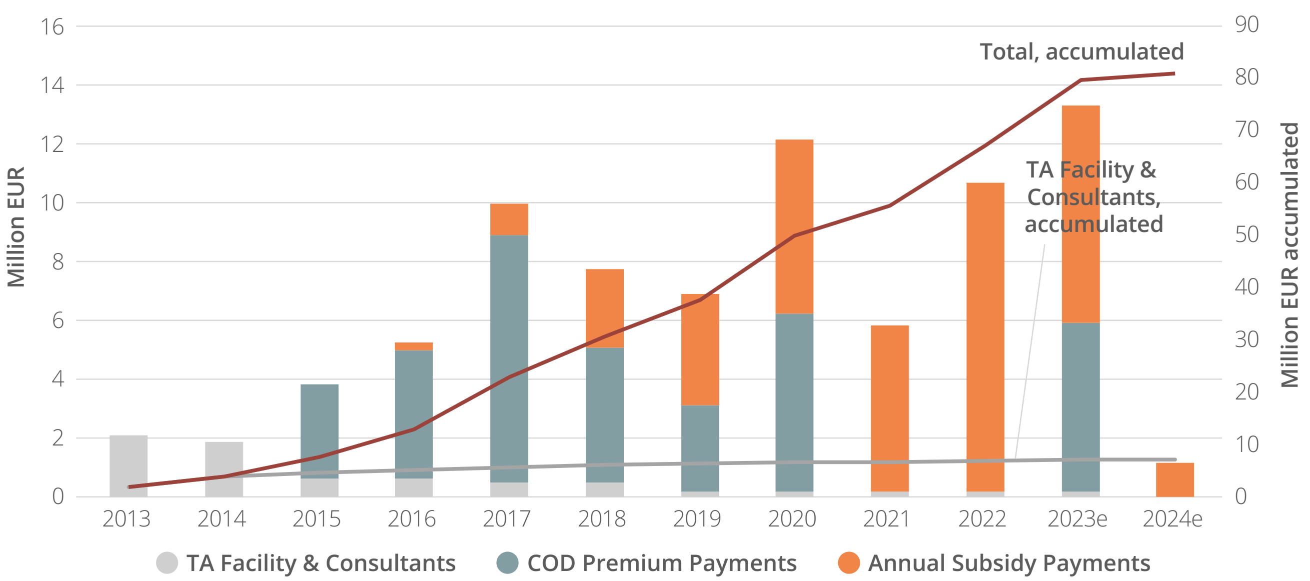


Figure 26 | Projected Annual Payments (Premium Payments and Consultants) under GET

Note: Projections are subject to budget uncertainty. Subsidy penalties were considered in the disbursement projection

[11] The GET FiT commitments to the interconnection component is not included in the financial status overview and disbursement projections.

Figure 27 shows the relative share of the various cost components under the GET FiT Programme based on current budget reservations. Overall, approximately 8% of the overall funds are tied to management, implementation and the TA Facility, while 92% of the total commitments are allocated to premium payments.

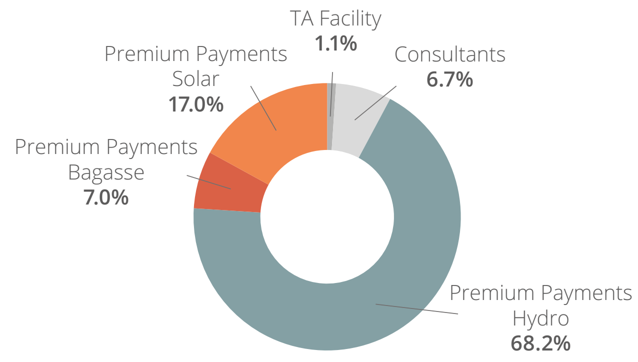


Figure 27 | Distribution of Budget Reservation of GET FiT Uganda

07 Programme Monitoring & Risk Management

7.1 Programme Monitoring

The GET FiT Monitoring and Evaluation framework monitors the results of the Programme through several quantitative indicators, which are collected from project developers and key sector stakeholders on an annual basis. The Programme's monitoring and evaluation is structured in a logical framework (Logframe) outlining the relationship between targeted Outputs, Outcomes and Impacts and setting baselines, expected milestones and targets.

2022 was the first year with all projects being operational throughout the year, which gets the Programme closer to achieving annual production targets. Overall, energy generation increased by approximately 20% year-on-year as the increase in capacity was partly offset by frequent and long grid outages with a total generation of 502 GWh. However, due to a lower share of biomass projects in the portfolio than anticipated, the original capacity targets of 170 MW and 830 GWh/year, will not be achieved. Programme targets have not been revised to this end. Other targets that relate to the portfolio size, such as finance mobilised, or displacement of thermal generation, are also be affected by the overall reduced capacity of the portfolio.

Notwithstanding, the Programme is already reaching, and even exceeding, some 2023 targets, such as job creation and sector-related indicators. We expect improved grid connection for some operational projects in the following years, as there are ongoing efforts to improve the grid infrastructure from the projects with high deemed energy.

An overview of the targeted Outputs, Outcomes and Impacts is provided in the overview below. The following section will address these goals in more depth, providing details and context on the development of the Programme.

Table 2 | Overview of Impact, Outcomes and Outputs

Outputs	Outcomes	Impact
1. Increased small scale RE capacity & generation **2.** Balanced portfolio of RE technologies **3.** Reduced GHG emissions **4.** Increased number of Ugandan national jobs **5.** Increased capacity of ERA **6.** Finance mobilised for GET FiT portfolio	**1.** Improved private sector investment environment for renewable energy in Uganda **2.** Improved financial stability of energy sector	Uganda pursues a low carbon, climate resilient development path, resulting in growth, poverty reduction and climate change mitigation.

Outputs

2022 marked the first year where the entire GET FiT portfolio was fully operational. With Kikagati, Nyamagasani 1 & 2 commissioning in 2021, the full planned capacity of 158 MW is now installed. The overall generation of 502 GWh in 2022 represents approximately 61% of the 2023 target. However, when comparing with the planned generation from the portfolio (which is slightly smaller than the targeted size), the production comprised 66% of the planned output. Grid outages were consistent with 2021 levels, which impaired the electricity generation, and led to relatively high deemed energy figures in 2022. The high deemed energy figures were to a large extent driven by evacuation problems from the three projects which were commissioned in 2021. However, we expect improvements in grid connection, which will rectify and improve the deemed energy figures in 2023. ERA has approved investments by UEDCL to undertake further necessary network improvements during 2023, as presented in Section 4.

The GET FiT portfolio is contributing to the country's geographical and technological diversification, being represented in most regions of the country and multiple renewable energy technologies. In addition, it is diversifying the group of developers, contractors and other players that participate in the Ugandan electricity sector; almost 50% of the grid connected generating power plants in the country (17 out of 36) are supported by GET FiT.

The GET FiT portfolio has direct effects on the local economy and made a substantial contribution to local job creation. This is represented by approximately 13,570 created jobs (FTEs – Full Time Equivalent), by far exceeding the initial target. In 2022, the portfolio has contributed another 580 FTE jobs, compared to last year's 1,260. This decline is due to the commissioning of the remaining projects, as construction jobs are no longer required and are replaced by mostly O&M workers. The share of Ugandan employment has significantly improved from averaging 86% in 2021 to 96% in 2022 but with fewer total available jobs in the operational phase.

In addition, indicators relating to the TA activities at the regulator ERA provide positive signals. ERA was ranked number 1 in the Africa Electricity Regulatory Index for the fifth consecutive year in 2022. However, the implementation of the RIMS component experienced further delays, and therefore the licensee reporting has not been digitalised yet. The expected project launch and execution end dates have been extended from December 2022 to June 2023, in consultation with KfW and ERA.

Also, more than USD 455 million in investments have been raised for the GET FiT portfolio – thereof, approximately USD 165 million are represented by private, and USD 290 million by public funding. Consequently, private financing represents a share of 36%.

Finally, the GET FiT portfolio, which is fully operational as of 2022, contributes to reducing Uganda's GHG emissions from thermal generation. Thermal generation has decreased the past few years, from 100 GWh in 2019 to 75 GWh in 2022.

An overview of all Output indicators is presented in **Table 3**.

Table 3 | Output Indicators

Indicator	Target 2023	Status 2022	Target Achieved	Comment
Output 1 – Increased small scale renewable energy capacity and generation				
Indicator 1.1 MW installed	170 (158.4)	**158.4**	93%	The last three projects commissioned in 2021, totalling an installed capacity of 158.4 MW. The original target of 170 MW will not be achieved due to lower availability of Programme funds and a lower share of biomass projects than originally expected.
Indicator 1.2 GWh/year delivered to the national grid	830 (762)	**502**	61%	Annual production has increased by 20%, from 418 GWh, since 2021. The Portfolio has an expected annual generation of 762 GWh, given production throughout the entire year (three projects commissioned late in 2021). Deemed Energy in 2022 was about 90.7 GWh, which is not considered in the reported value.
Output 2 – Balanced portfolio of renewable energy technologies				
Indicator 2.1 Number of technologies supported by GET FiT	4	**3**	75 %	Supported technologies include hydropower, solar PV and bagasse.
Indicator 2.2 Number of sub-regions with GET FiT projects	5	**4**	80 %	The GET FiT portfolio includes 4 regions: Western, South-Western, Eastern and Central.
Output 3 – Reduced GHG emissions				
Indicator 3.1 Net change in GHG emissions (Cumulative $MtCO_2e$)	4.03	**1.5**	37%	The cumulative net change in 2021 was at 1.17 and increased by approximately 330,000 tonnes during 2022. The indicator is behind target due to the delayed portfolio implementation.
Output 4 – Increased number of Ugandan national jobs				
Indicator 4.1 Number of direct national construction and O&M jobs (FTE) created	4,200	**13,577**	323%	GET FiT is exceeding targets on this indicator. More than 580 full-time equivalent (FTE) jobs were created in 2022.
Output 5 – Increased capacity at ERA				
Indicator 5.1 Time taken by ERA to review generation licence for 1-20 MW renewable energy applications (months)	2	**NA**	NA	No generation licences reviewed in 2022
Indicator 5.2 Number of REFiT tariff reviews taking place by ERA per year	1	**0**	100%	Renewable Energy Feed-in Tariffs (REFiTs) are not reviewed on an annual basis. Procurement of a consultant has been finalised to revise and establish the REFiTs for up to 50MW for Hydropower, bagasse, wind, and solar, and establish a possible transition to alternative onboarding for RE projects
Indicator 5.3 Timely and complete reporting to ERA by licensees	100 %	**95%**	95%	177 out of 186 reports were submitted complete and on-time in 2022. ERA in Partnership with the World Bank is developing framework which will feed in the Compliance reporting for Licensees. The assignment will be completed within 2023.
Indicator 5.4 Online delivery of ERA services	50 %	**0%**	0%	The Regulatory Information Management System (RIMS) is expected to be rolled out in June 2023.
Output 6 – Finance mobilised for GET FiT portfolio				
Indicator 6.1 Private finance mobilised for GET FiT portfolio (in USD million)	200	**165**	83 %	All projects have reached financial close. Due to the reduced portfolio size following inception, the target will not be reached.
Indicator 6.2 Public finance mobilised for GET FiT portfolio (in USD million)	300	**290**	97 %	Mobilised finance at financial close. All projects have reached financial close. Due to the reduced portfolio size following inception, the target will not be fully reached.

Outcomes

The outcomes address the influence of GET FiT at a higher sector level, namely on the private sector investment environment for renewable energy in Uganda and improved financial stability of the energy sector. A third indicator on local grid stability was excluded from the Logframe in 2018.

Four commercial banks were providing financing to the GET FiT portfolio at Financial Close, and as further projects restructure debt in the future, it is expected that more commercial banks will become involved in the Ugandan energy sector. While the power utility UETCL has paid all its invoices for delivered energy in 2022, seven developers have reported delayed deemed energy payments. These delays are not considered since deemed energy claims are not approved for payment by UETCL but by ERA. ERA has been conducting a thorough verification process in 2022 to ensure that the claims are accurate, thus delaying the payment of deemed energy.

There were four permits issued by ERA in 2022, a decline from last year and well below the target of 12 permits and approvals per year. Thermal generation is generally showing a downward trend, and was at 75 GWh in 2022, well within the target of less than 832 GWh Thermal generation per year. The retail tariffs continue to be 97% cost-reflective, for the fourth year in a row, which is slightly below the target of 100% cost-reflectiveness.

An overview of the Outcome indicators is provided in **Table 4**.

Table 4 | Outcome Indicators

Indicator	Target 2023	Status 2022	Target Achieved	Comment
Outcome 1 – Improved private sector investment environment for renewable energy in Uganda				
Indicator 1.1 Number of commercial banks that invest in renewable energy for project finance lending for GET FiT projects	5	**4**	80 %	No Uganda commercial bank is among lenders, due to a lack of technical competence and energy sector experience, according to developers.
Indicator 1.2 Number of development permits and generation licences issued for small-scale projects (1-20 MW) by ERA per year	12	**4**	34%	Four permits were issued in 2022 to two cogeneration plants, one hydro-power plant and one solar plant.
Indicator 1.3 Occurrence of annual "UETCL event of default" for energy supplied	0	**0**	None	No UETCL defaults on payments for delivered energy. Seven projects have reported delayed deemed energy payments. These delays are not considered for the indicator since deemed energy claims are not approved for payment by UETCL but by ERA.
Indicator 1.5 REFiT adjusted to be cost-reflective	100 %	**100 %**	100 %	The REFiTs have ceiling tariffs and a maximum return on equity for respective technologies.
Outcome 2 – Improved financial stability of the energy sector				
Indicator 2.1 Subsidy paid by the Government for UETCL to cover thermal power use	0	**0**	0	All energy purchased beyond stand-by capacity was covered by tariffs.
Indicator 2.2 GWh purchased by UETCL from thermal stations	832	**75**	N/A	The sector is well below target due to i) lower demand for thermal power than anticipated and ii) thermal energy being offset by renewable energy from the GET FiT portfolio and commissioning of Isimba. UETCL purchased more thermal generation in 2022 than 2021, a 47 percent increase year on year. UEGCL took over Namanve complex in 2022.
Indicator 2.3 Cost-reflective retail tariffs	100 %	**97 %**	97 %	Capacity payments remain part of the subsidy paid by the Government. These increased from 95% in 2018, to a cost reflectivity at 97% in 2019. The cost reflectivity has since remained at the same level (from 2019-2022).

Impact

The Programme follows the impact statement "Uganda pursues a low carbon, climate resilient development path, resulting in growth, poverty reduction and climate change mitigation". The impact of the Programme is measured through three indicators, which are presented below. Due to the heavy reliance on the activities of key sector actors to reach the targets, the effects of GET FiT Uganda are limited to a certain extent, and subject to a time lag between GET FiT activities and observable results at a higher sector level.

The target related to grid-related CO_2 emissions per kWh of electricity used in Uganda was achieved some years ago and continues to decline each year. From 2021 to 2022 the CO_2 emissions per kWh decreased by 13%.

UBOS has reported a national grid electrification rate of 19% in the financial year 2021/2022. The percentage of the population with access to electricity has reduced from 28% in 2019 to 19% in 2022. This is attributed to the faster rate of population growth than the rate of electricity connections, compounded by the discontinuation of the Electricity Connections Policy by GoU in 2020 due to lack of funding.

According to the UBOS Statistical Abstract of 2022, Impact Indicator 3 was achieved in 2020. There has been no official update on the electricity consumption per capita since then.

The overview of the impact indicator developments in 2022 can be found in **Table 5**.

Table 5 | Impact Indicators

Impact Indicators	Target 2023	Status 2022	Comment
Indicator 1 Grid related CO_2 emissions per unit electricity use	0.09	**0.01**	Grid related CO_2 emissions per unit electricity use decreased well below target of 0.09.
Indicator 2 Percent of population with access to electricity	26.4 %	**19 %**	UBOS has reported a national grid electrification rate of 19% in the financial year 2021/2022.
Indicator 3 Electricity consumption (kWh per capita)	105	**108**	Based on UBOS Statistical Abstract for 2022.

7.2 Risk Management

Risk assessments, monitoring and mitigation to alleviate the risks of external factors impacting the Programme in a negative way, have been very important for the Programme to date. It is still an important part of the Programme to keep improving results and leaving behind a positive impact in the country and the region. In risk management, it is important to both keep an eye on how probable it is that the risk will occur, and what impact it will have on the Programme if the risk occurs. Only then can one determine whether the risk profile is high, and how important it is to implement proper mitigation measures/actions.

With the entire generation profile operational, the risks of the Programme have changed substantially. The evacuation of power remains a major concern, as the medium and high voltage national grid remains constrained. The implementation of grid infrastructure projects to mitigate some of these concerns is progressing, however, with some challenges during 2022. Health risks related to COVID-19 that had an impact on construction activities in 2021 are significantly reduced with the entire portfolio being in operation and appropriate health and safety protocols and guidelines in place. A major concern remains with the outstanding implementation of solutions for fish migration at the Kikagati SHP and Nyamagasani 2 SHP. Further, risks related to insufficient hydrological data during project design remain, which can influence the planned performance of the project portfolio.

An overview of the most relevant remaining risks across the Programme is presented in **Table 6**.

Table 6 | Risk Matrix

Description of Risk	Mitigation Actions	Progress	Risk Assessment
The new power lines for grid connection of GET FiT projects cannot be concluded due to severe implementation delays, as the GET FiT funding window is nearing its end.	Ongoing high-level engagement with the relevant GoU agencies, and agreeing on specific milestones to be reached to facilitate the timely implementation and completion of the line.	The project experienced delays during 2022. In engagements between GET FiT/KfW and GoU, it was agreed that acceleration of implementation is a priority for the Government. Wayleaves compensation payments have progressed, but additional verification of information for compensation was still outstanding at the end of 2022 and expected to be finalized by mid 2023. Construction works are expected to conclude in late 2023.	high
Operational GET FiT plants generating power at reduced capacity due to continuing, unresolved constraints of the high and medium voltage national grid.	Additional funding provided by GET FiT donors to support selected, critical grid infrastructure investments required for connection of GET FiT projects. Comprehensive efforts by GET FiT to fast-track implementation of grid infrastructure projects managed by GoU agencies, which are relevant to the GET FiT portfolio is ongoing, but has proven challenging.	Unsatisfactory progress on grid infrastructure projects in 2022 due to various ongoing implementation challenges.	high
Lower generation than estimated due to insufficient hydrological data and/or climate change.	Risks were included and diligently assessed in hydrological estimates and sensitivity testing at project evaluation stage.	Generation data for all projects is continuously followed up by GET FiT. Some plants already see a very different hydrology compared to the hydrology used as a basis for the generation estimates at application stage. Nevertheless, based on the first years of operation, the upside and downside at project level has averaged out at portfolio level, with total generation being almost 100 % of the estimated annual portfolio generation.	medium

Corruption, misuse of funds and bribes paid by developers or contractors.	Subsidies are performance-based and disbursed for energy delivered to prevent misuse of funds. Zero tolerance of bribes is agreed in developer's contracts, leading to termination of contracts, as well as repayment of fees as consequence.	Generally the risk is lower for operational projects, and as such the risk assessment conclusion has been reduced from medium in the 2021 AR. The risk is still present, as 3 projects have still not received their COD report, and that operational projects can see advantages of bribes to get generation licences/ approvals quicker, or get proof of higher production than actually occured.	medium
Compliance with Environmental and Social standards of developers. Several operational projects have at times not fulfilled environmental flow requirements.	Workshops on E&S standards were provided to developers. Penalties for non-compliance are incorporated in subsidy agreement (DFA). Additional supervision visits are carried out for underperforming projects. A water and energy sector working group was established in 2021 in close cooperation with the relevant GoU authorities, addressing the issue of minimum/environmental flow compliance for hydropower projects. The group is financed by GET FiT. A study on E&S Risks and Potential Impacts will be conducted, resulting in publication of lessons learned and dissemination of results through a Workshop with relevant stakeholders.	Some projects still perform unsatisfactorily. GET FiT has carried out multiple additional supervision visits, and imposed penalties on some developers. Compliance is continuously followed-up, including via post commissioning visits. The risk of non-compliance and associated reputational risks remain. The Environmental Flow Working Group has developed a methodology to deduct illegal water abstractions from energy payments from GET FiT. Work on this and other activities will continue in 2023.	medium
Fish migration issues at Kikagati and Nyamagasani 2 remain unresolved. The main risk remaining at both projects is unsafe downstream fish migration that may result in excessive fish mortality if fish enters the project intake and waterway, and adequate mitigation measures are not implemented.	The E&S issues at the newly commissioned plants are being followed up through bi-weekly meetings with the developers. Monitoring is ongoing, and independent review and support in fish monitoring via an independent consultant is being actively pursued. Potential changes in project operational regimes during the downstream migratory season are discussed as a remedy. The issues need to be resolved before a GET FiT COD report can be issued and the COD subsidy payment can be made.	Continued intensive dialogue with the developers to try to resolve the issues. Terms of Reference for an independent consultant on fish migration monitoring has been drafted and procurement is starting.	high
Insufficient Programme funds due to foreign exchange rate developments.	Continuous budget monitoring allows for pro-active financial management and early identification of risks and Steering Committee action if needed. A FOREX buffer has been set aside in the project budget to allow for reasonable fluctuations.	It is a low risk that exchange rate developments will constrain planned project disbursements, as there are currently residual funds due to lower subsidy payments than anticipated at inception. There has been a negative exchange rate development during 2022 for disbursement commitments in GBP, but it is not yet lower than at the end of 2020.	low

08 Other GET FiT Initiatives

8.1 GET FiT Zambia

The second roll-out of the GET FiT concept – GET FiT Zambia - was launched in 2018, with the same overall objective to improve the framework conditions for private investments in small-scale renewable energy in the country. The principal component of GET FiT Zambia is the procurement of up to 200 MW in renewable energy capacity from IPPs. The project size is 1 MW up to 20 MW. The Programme is a partnership between the Zambian Ministry of Energy and KfW and is implemented by the GET FiT Secretariat (managed by Multiconsult). Other key stakeholders are the Energy Regulation Board (ERB) and the state-owned power utility ZESCO Limited.

GET FiT Zambia comprises a set of tools that address barriers and gaps in the Zambian energy sector (see illustration below).

A total of six (6) solar PV, with a total installed capacity of 120 MWac, projects were awarded to three (3) consortia, under the first tender in 2019. The tender was set up as a reverse auction, and it achieved record-breaking bids for Sub-Saharan Africa. The lowest price achieved was 3.999 USc/kWh, and the weighted average of the six (6) successful projects was 4.41 USc/kWh. The financial close of the projects has been delayed due to a challenging macroeconomic environment in the country, as Zambia became the first post-Covid country to default on its debt. Though it has subsequently secured a debt relief package from the IMF, the debt restructuring negotiations with creditors are still ongoing. The Small Hydropower Programme request for proposal (RfP) has therefore also been put on hold until the situation improves.

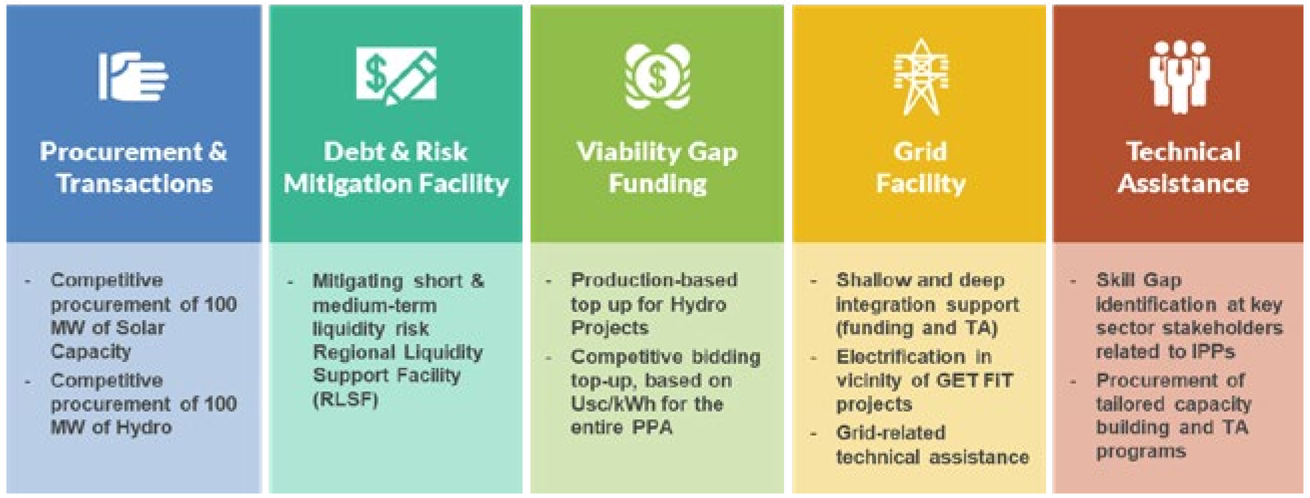


Figure 28 | GET FiT Zambia Toolbox

In the meanwhile, there has been a strong focus on Technical Assistance activities and finding solutions for further implementation of the Programme. With the current energy crisis in Zambia, there is renewed hope that the correct efforts will be made to again prioritize implementation of energy generation projects and diversification of the production portfolio. The REFiT strategy (which GET FiT Zambia is the implementing Programme for), aiming at facilitating private sector investment in small- and medium-scaled in Zambia, was developed after the 2017 energy crisis in the country. The climate change impacting the rainfall and water availability in the country more and more on a regular basis, is proof that diversifying the energy generation mix has never been more urgent than now, and programs like GET FiT can help alleviate this crisis.

The Programme hopes to finally come to a breakthrough with the generation projects in its portfolio so that it can help improve the county's generation mix and act as a catalyst for future renewable IPP private sector development and support the country in future years when the next drought appears.

Further Information & Updates

Stay informed about development in the GET FiT Zambia Programme, please visit the website **www.getfit-zambia.org,** sign up for the GET FiT Zambia **newsletter,** or follow the Programme on LinkedIn and Twitter.

8.2 GET FiT Mozambique

Mozambique is generously endowed with renewable energy resources – with the largest hydropower potential in Southern Africa and favourable conditions for electricity production from solar, wind and biomass. However, the country is still suffering from low electricity access rates. As of 2020, Mozambique's installed capacity approximately consists of 79% hydropower, 20% natural gas and diesel and 1% solar, totalling 2.85 GW. The state-owned utility, EDM, operates about 1 GW of this. Several large energy development projects are in the pipeline. The Mozambican power system is characterised by long distances between the large generation centres and the most important load centres, with long and overloaded power lines resulting in poor power supply. The government and EDM recognise the need to work with the private sector and alleviate the challenges related to under-capacity of energy infrastructure and weak security of supply to facilitate the investments that are required for Mozambique to achieve its ambitions of ensuring access to affordable and sustainable energy for its population.

Building on experience from Uganda and Zambia, the third roll-out of the GET FiT concept, in Mozambique will provide support to unlocking private investments in RE projects by reducing risks, improving attractiveness of the investment environment, increasing institutional capacity, and building a track record of successfully implemented projects. GET FiT Mozambique is financed by the German Financial Cooperation and the European Union through KfW Development Bank and implemented by the Ministry of Mineral Resources and Energy (MIREME) as Project Executing Agency with the support of Multiconsult Norge AS as Programme Implementation Consultant. The Government of Mozambique and KfW signed the Financial Agreement for the Programme in 2019 and its implementation kicked off in May 2022.

At the core of the Programme is procurement of generation capacity by Independent Power Producers (IPPs). The first round will be a competitive international reverse auction for privately promoted Solar PV with battery energy storage systems (BESS) projects, with capacities of approximately 4 to 15 MW. The total capacity awarded will be around 25 - 30 MW, depending on the price outcomes of the competitive procurement process. The tender will be conducted under the aegis of the energy regulator ARENE, with EDM as offtaker. The introduction of BESS as part of the tender is a new innovation for the GET FiT programme.

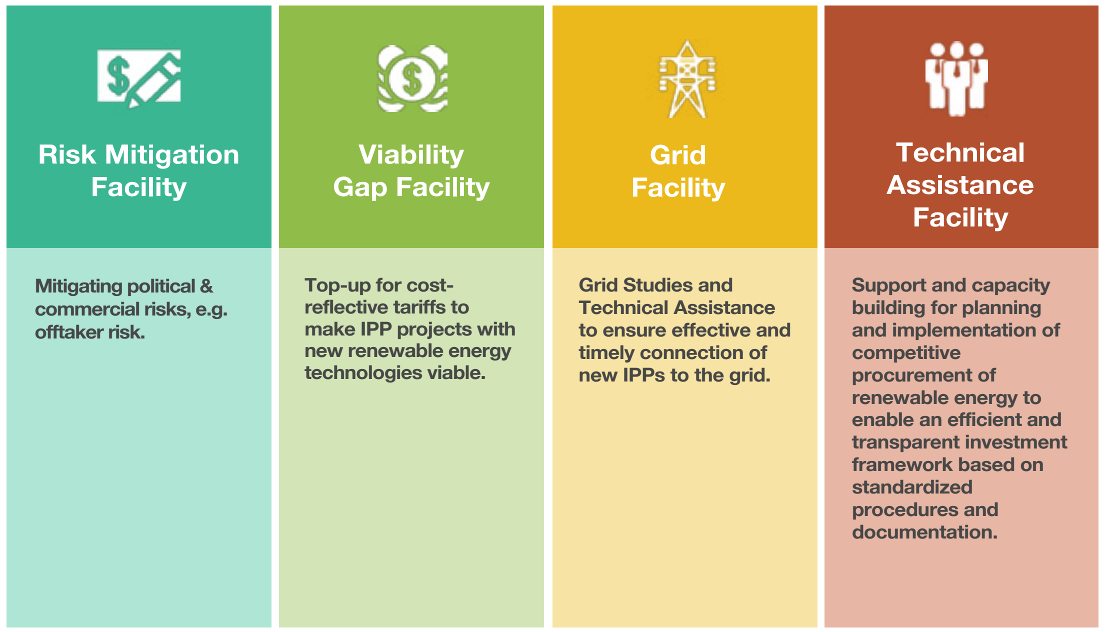


Figure 28 | GET FiT Mozambique Toolbox

In December 2022, the European Union announced its participation in the Programme with 20 million Euros. This additional programme funding will support the second round, targeting SHPs.

As in Zambia and Uganda, the Programme's toolbox includes several instruments to support the development of the energy sector in Mozambique:

The German Government is also supporting the Green People's Energy for Africa. This Programme includes a window for private sector led mini-grid developments in Mozambique, which is foreseen to be implemented under the same implementation framework as GET FiT, and with FUNAE as a key stakeholder. The Green People's Energy for Africa is expected to kick off in the first half of 2023, and with a funding of around EUR 23.5 million, targets supplying at least 7,000 businesses and households in remote rural regions, many of which will receive electricity for the first time.

For further information about GET FiT Mozambique, please visit the website:
https://www.getfit-moz.org/.

09 Outlook

The GET FiT Uganda Programme has achieved some significant milestones since its inception in 2013, from enabling a lower risk environment for private investment, to overseeing the implementation of 17 small-scale renewable energy projects. The job is not yet finished, however, and there are several outstanding issues that remain a key focus in the coming year, working towards a successful conclusion for the Programme in 2024.

A key priority will be to follow up the implementation of the Interconnection Component, with the aim of the work being completed by the end of 2023. The project will improve power evacuation of several GET FiT projects, as well as other generation projects in the region, thereby substantially reducing deemed energy liabilities for GoU.

Resolving fish migration issues at two of the small hydropower projects also remains a clear priority. We will continue to work closely with the projects and relevant agencies to find solutions that minimise risks and mitigate impacts to within acceptable levels.

Work will also continue under the Environmental Flow Working Group, which was launched in 2021. Key activities will include reviewing and summarising lessons learned in relation to environmental flows during the implementation oversight of the 14 GET FiT supported small hydropower projects and proposing practical guidance for future handling of such flows, contributing to the sustainable development and compliance monitoring of existing and future small hydropower projects and ensuring a lasting Programme impact.

Finally, GET FiT will work towards the successful completion of the RIMS at ERA, conclude the subsidy disbursement for most projects in the portfolio, and continue to record lessons learned during the implementation of the Programme.

Although some issues will not be resolved until the successful conclusion of the Programme in 2024, its stakeholders have a lot to be proud of from its 10 years of operating in Uganda. With dedicated and focussed efforts in 2023-2024 to conclude the remaining activities, we now look forward to a successful Programme conclusion.

Picture credits
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