Distributed Generation in Africa

Future-Proofing a Reliable Electricity Supply for Commercial, Industrial and Residential Sectors

IMPACT CASE STUDY

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Introduction

In this series of **Impact Case Studies**, GET.transform sheds light on the tangible and lasting results of advancing energy transitions in partnership with high-impact countries and regions. Focusing on both policy, regulatory and technical reforms, each case explores how tailored advisory, collaborative dialogue, and hands-on implementation have translated into real-world progress. More than snapshots of success, the case studies surface valuable lessons on what has worked and what has not—insights that may inform future strategies for enabling clean, affordable, and reliable energy systems. Together, they aim to capture how targeted support can create ripple effects far beyond individual interventions.

With their rich natural and mineral resources, African economies have great potential to develop local businesses, jobs and participate in the global supply chains and manufacturing. However, this potential has not been realised due to multiple barriers. For instance, Africa's current share in global manufacturing remains marginal at less than 2%.1 Domestically both large and small-scale enterprises and service centres face several challenges. A major barrier to industrialisation and competitiveness, especially in Sub Saharan African countries is access to reliable and affordable power.

This case study delves into the **challenges and opportunities presented by the growth of distributed generation (DG) in Africa, particularly solar photovoltaics (PV), against the backdrop of the continent's industrialisation and economic development**. For the purposes of this study, DG is any small to medium scale generation that takes place near the point of consumption on the consumers side of the electricity meter, and which is connected to the main distribution grid via low- or medium voltage network, often from a source such as solar PV. The approach discussed in this Impact Case Study to address the various opportunities and challenges brought on by the spread of DG has the potential to unlock significant portions of power on the continent and spur industrial and economic growth.

GET.transform extends its immense gratitude to all parties who contributed to bringing this approach to life. This includes the knowledgeable implementation partners of the dedicated Policy Catalyst Distributed Generation Window: Sustainable Energy Africa (SEA), the African Forum of Utiilty Regulators (AFUR) and the Association of Power Utilities of Africa (APUA). Grateful acknowledgement equally goes out to the regulators and utility partners who dedicated their time and expertise to advancing understanding of how to effectively integrate distributed generation onto power grids:

[1] UNIDO, 2023

Eswatini	Eswatini Electricity Company Eswatini Electricity Regulatory Authority
Kenya	Energy and Petroleum Regulatory Authority (EPRA) Kenya Power and Lighting Company
Lesotho	Lesotho Electricity and Water Authority (LEWA) Lesotho Electricity Company (LEC)
Liberia	Liberia Electricity Regulatory Commission Liberia Electricity Corporation
Madagascar	Jiro sy Rano Malagasy Office de Régulation de l'Electricité
Mozambique	Ministry of Mineral Resources and Energy Autoridade Reguladora de Energia (Arene) Electricidade de Moçambique E.P
Namibia	Electricity Control Board (ECB) NamPower
Senegal	Ministry of Energy and Renewable Energy Development Commission de Régulation du Secteur de l'Electricité Société Nationale d'Électricité du Sénégal
Uganda	Electricity Regulatory Authority (ERA) Uganda Electricity Distribution Company Limited Umeme Limited
Zimbabwe	Zimbabwe Electricity Regulatory Authority (ZERA) Zimbabwe Electricity Transmission and Distribution Company (ZETDC)

Their willingness to engage in open dialogue, share insights, and explore innovative approaches has been invaluable in shaping strategies that promote grid reliability, resilience, and sustainable energy futures.

Partner Testimonials

"DG is advancing and advancing very fast. As a regulator we need to catch up very fast to put in place the rules, the requirements to connect, ensure that utilities have built the capacity from the aspects of assessing the application for DG and screening them.

Peter Kakeeto
Manager, Technical Compliance and Monitoring
Electricity Regulatory Authority, Uganda

"In this workshop, you get a deep dive onto the different layers involved in terms of DG. Firstly, you understand the technology because there's a lot of, misunderstandings around the technology. You understand the positive and negative impacts. You also understand how you can circumvent those impacts and actually maximize on the benefits of DG as a utility.

Nosipho Simelane-Dlamini
Research and Renewables Engineer
Eswatini Electricity Company, Eswatini

"The methodological knowledge and operational expertise developed by this training now give Madagascar a significant competitive advantage in the implementation and sustainable management of distributed production systems.

Sarah Razafindrangita
Legal Affairs Coordinator
JIRAMA, Madagascar

1 The Challenge

DG has seen immense traction on the African continent in recent times. In just one year since June 2024, there has been an exponential growth in the importation of solar panels in Africa, reaching 1.5GW — a 60% increase compared to the preceding one year.[2] This growth is likely driven more by distributed solar than utility scale PV. Rooftop PV or solar DG is currently the second largest generation asset in South Africa with a total installed capacity of approximately 6.5 gigawatt (GW) compared to approximately 45GW of coal[3], 3.5GW of utility scale wind and 2.3GW of utility scale PV.[4] Solar DG in Kenya has also grown dramatically since 2020, with a total installed capacity of approximately 225 megawatt (MW), compared to 200MW of utility scale solar and 425MW of utility scale wind.[5]

With diesel's prohibitive costs, both in monetary and climate terms, and with the significantly declining costs of renewable technology, solar based systems for self-generation have gained in popularity. This trend is further fuelled by increasing electricity rates and unreliable electricity supply that hinder economic activity and daily life. Access to green financing options with the use of climate friendly technology and processes has added to the attraction of renewable energy, especially for businesses.

With this growing interest in renewable DG, the private sector including industries, businesses, commercial centres and even residential complexes, have been more than ready to invest, procure and install such systems. Indeed, commercial and Industrial (C&I) systems make up a majority (estimated at over 80%) of the DG capacity in most African countries.[6]

In this context, further inclusion of DG in the energy supply mix has the potential to not only address energy access needs and drive cost savings but also provide utilities with an opportunity to bring more flexibility to their grid networks. It also offers a great opportunity to invigorate economic activity. However, this potential is currently constrained due to lack of well-defined and streamlined regulatory frameworks for DG.

Unchecked and unregulated proliferation of DG presents concerns in terms of technical safety, power quality, hosting capacity and revenue impact on utilities. In many countries, despite their responsiveness, regulators and utilities have not been fully prepared for these challenges and have struggled to keep up in terms of regulations and processes for safely integrating DG systems into their

[2] Ember Energy, 2025
[3] GX-0001-Generation-Plant-Mix-Rev-29.pdf
[4] Sustainable Energy Africa, 2025
[5] Sustainable Energy Africa, 2025
[6] Sustainable Energy Africa, 2024

networks. The situation is further complicated if utilities are not fully prepared to have increased DG capacities connected to their networks as this can negatively impact their revenue base in the absence of well-defined tariffs.

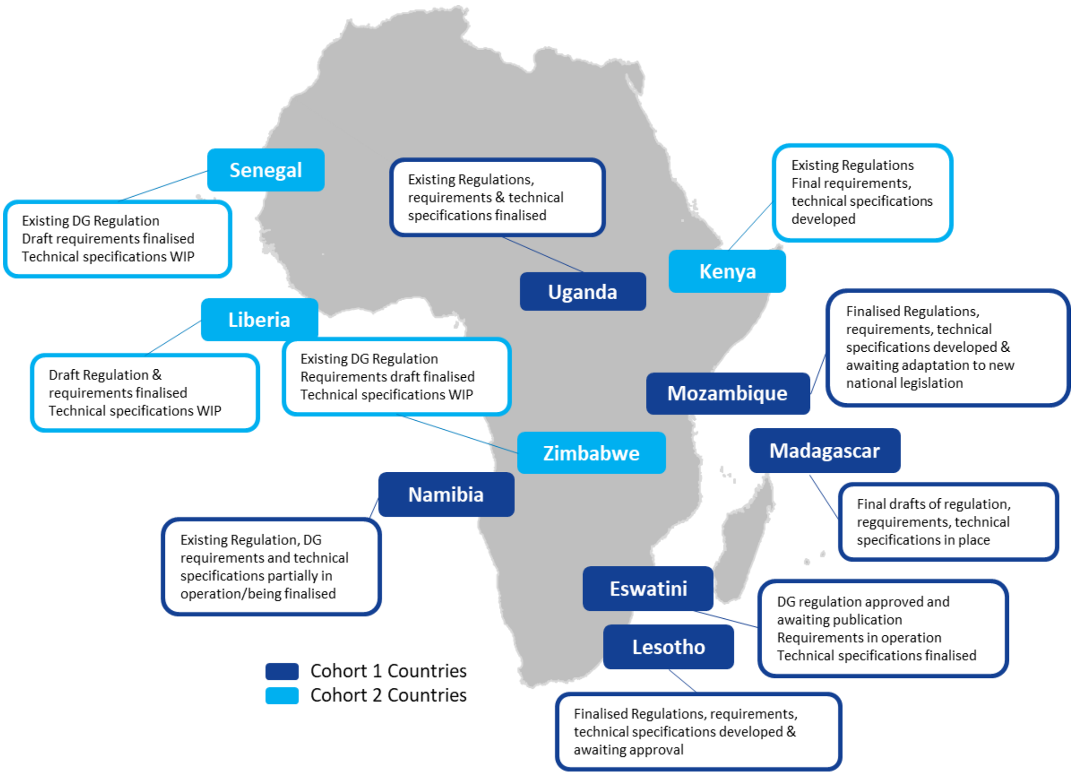
For instance, to address the challenge of unauthorised connection of DG, Madagascar opened official registration for DG. However, with advanced regulatory framework, technical standards and registration guidelines or processes still to be put in place, and a limited experience in handling DG applications and requests, the regulator/utility could not immediately respond to the applications it had received (over 10MW in total). This backlog led the regulator/utility to put a freeze on any new applications since early 2025.

The situation is not unique to Madagascar but symptomatic for many countries. Kenya's Electricity Act of 2019 established a framework for DG installers to enter into net-metering system arrangements with the utility. This framework was operationalised through the Energy (Net-Metering) Regulations in June 2024, resulting in a similar situation to Madagascar. Although Kenya had the operational regulation in place, the utility process to approve applications was still under development. This led to a backlog of applications, with associated pressure from developers around the resulting delays.

With many regulators and utilities facing the challenge of keeping up with growing presence of DG in their countries, and limited in terms of capacities and experience, it is key to ensure that necessary frameworks, standards and specifications are instituted to enable DG connections in a responsible, technically sound and legal manner. Additionally, to avoid the negative impact on utility revenues, tariff setting principles need to be developed to allow utilities to recover network costs for the distributor while balancing consumer interests and ensuring the right balance of incentives for DG to flourish.[7]

[7] GIZ, 2021

FIGURE 1 Status of DG in Participating Countries at the Outset of the Window



Source: GET.transform/SEA

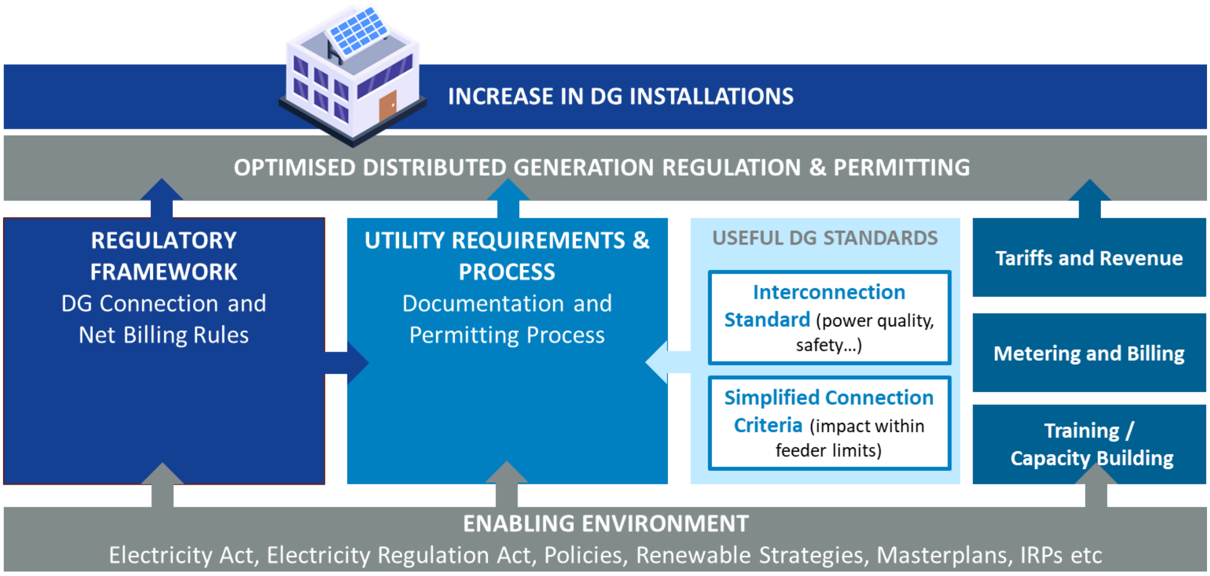
2 The Approach

With the above challenge of effective integration of Distributed Generation in mind, GET.transform and Sustainable Energy Africa (SEA) jointly rolled out the DG Policy Catalyst Window in partnership with the African Forum for Utility Regulators (AFUR) and the Association of Power Utilities of Africa (APUA).

Over the course of a year, the Window supports regulators and utilities from 10 African countries in **building up regulatory, operational, and staff readiness to successfully integrate DG installations**. This includes the development of regulatory frameworks and processes for registration and permitting purposes; technical specifications to ensure planned and safe integration of DG on the national grid; and capacity building on key topics including tariff determination, revenue and grid impact of DG, and bi-directional metering. A typical DG framework takes the form of net metering, net billing or feed in tariff regulation, specifying the KW or MW limit of the systems allowed to be connected to the grid and the registration mechanism and information to be submitted to the regulator and utilities by the installers. It further provides whether power can be fed into the grid, how customers exporting power can be compensated or credited, and the tariff principles to be followed in determining the export or feed in tariff. Technical connection criteria and specifications prescribe maximum export capacity of a DG system with reference to medium or low voltage feeders, allowed maximum charging current, allowed voltage fluctuations or deviations, frequency response guidelines, control function requirements etc. Planned and well-defined tariffs allow utilities to recover network and service costs by unbundling it from kilowatts used costs.

The Policy Catalyst approach combines the delivery of workshops and trainings on core DG topics to all participating countries as a cohort with individual implementation support on adoption and implementation of DG frameworks to each country in accordance with an ongoing needs assessment.

FIGURE 2 Building Blocks for Safe and Streamlined Addition of DG to the Grid



Source: SEA/GET.transform

Regulation and Processes: The Window provides a starting point in the form of pre-prepared model templates for DG regulations like Net-metering or Net-billing frameworks; Utility Requirements and Permitting Process; Connection and Billing Agreement between utility and consumer; and DG Commission Report for checks to be performed before issuance of a generation permit by the utility. More importantly, cohort countries are supported in the customisation of the templates to their country specifications. This is accompanied by legal reviews and studies in each country to understand its legislative background and constrains and further inform the customisation and refinement of the regulatory drafts which are then finalised through stakeholder reviews and consultations before being submitted for due approval and gazetting.

Technical Specifications: Parallel to the regulatory intervention, the Window supports the development of technical specifications in the form of Interconnection Specifications and Simplified

Connection Criteria for each country. This ensures that the introduction of DG complies with the Grid Code and does not negatively impact the existing national grid network, and that connections are carried out in accordance with allowable DG penetration based on hosting capacity assessments. In addition, the impact of various DG penetration scenarios on the national generation system for each country is clarified to address questions utilities and regulators have regarding their longer-term implications for system planning.

Capacity Building: At various intervals throughout the duration of the DG Policy Catalyst Window, participants from cohort countries receive trainings on: (1) essential regulatory aspects and checks to consider when permitting or registering DG systems; (2) how to determine DG tariffs to account for their share of network fixed and variable costs while balancing the interest of the consumer and their business case for installing DG; (3) the purpose, working, and types of bi-directional meters that allow utilities to accept DG export into their networks; (4) grid impact studies which are needed in the event limits set under a simplified connection criteria are exceeded. If required, staff members from regulatory authorities and utilities from respective countries are also provided with hands on support in the processing of DG applications.

All of the aforementioned support is provided in a structured programmatic format over a period of 10 to 14 months in group and individual country settings to allow for peer learning as well as focused implementation in each country.

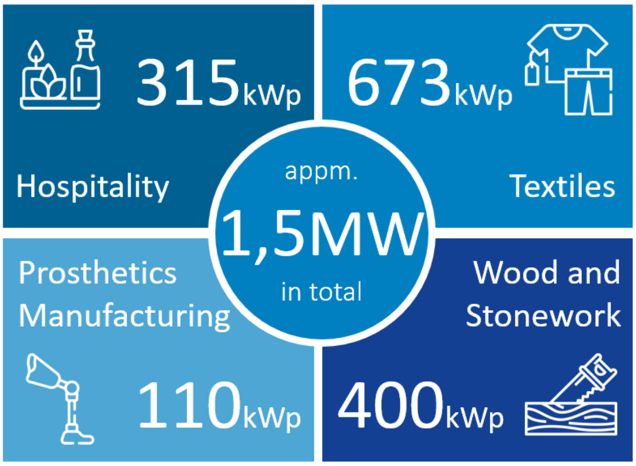
The DG Policy Catalyst Window was launched in March 2024 with its first cohort comprising of regulators, utilities and ministry personnel from Eswatini, Lesotho, Madagascar, Mozambique, Namibia, and Uganda. The results and impact of this approach are outlined in the following section. A detailed dashboard for each of the first cohort country's progress is also provided in the Annex 1 below.

3 The Impact

Since early 2024, all 6 countries of the first cohort have developed regulations and processes to promote DG in a safe and regulated manner. While Uganda and Namibia already had an enabling regulatory framework in place, Eswatini, Lesotho, Madagascar and Mozambique developed new DG frameworks under the Window. Eswatini has already completed all internal approval processes for its framework and is only awaiting official publication. Stakeholder consultations have been held in Uganda and Lesotho towards approval of the DG frameworks. Additionally, all 6 countries now have DG utility requirements, permitting processes, technical connection criteria and standards in place. To complement these developments and digitalise application processing, online application portals are being developed for Eswatini and Namibia and will be piloted early 2026.

To operationalise the regulations and processes, hands on workshops are planned for all countries to needing assistance in clearing DG applications by providing guidance and experience in processing these requests. **Madagascar** has been the first country to receive such support and over a period of 2 days the state utility La Jirosy Rano Malagasy (JIRAMA) and the regulatory authority Office de Régulation de l'Electricité (ORE) have cleared an initial backlog of six connection requests amounting to 1.5MW of DG. This has cleared the pathway for improved energy access to a number of enterprises including textiles, woodwork, hospitality and more. Figure 2 below gives an overview of the types of industry and their planned installed capacities which have been approved by JIRAMA and ORE.

FIGURE 3 DG Commercial & Industrial Applications Unlocked in Madagascar



Source: GET.transform

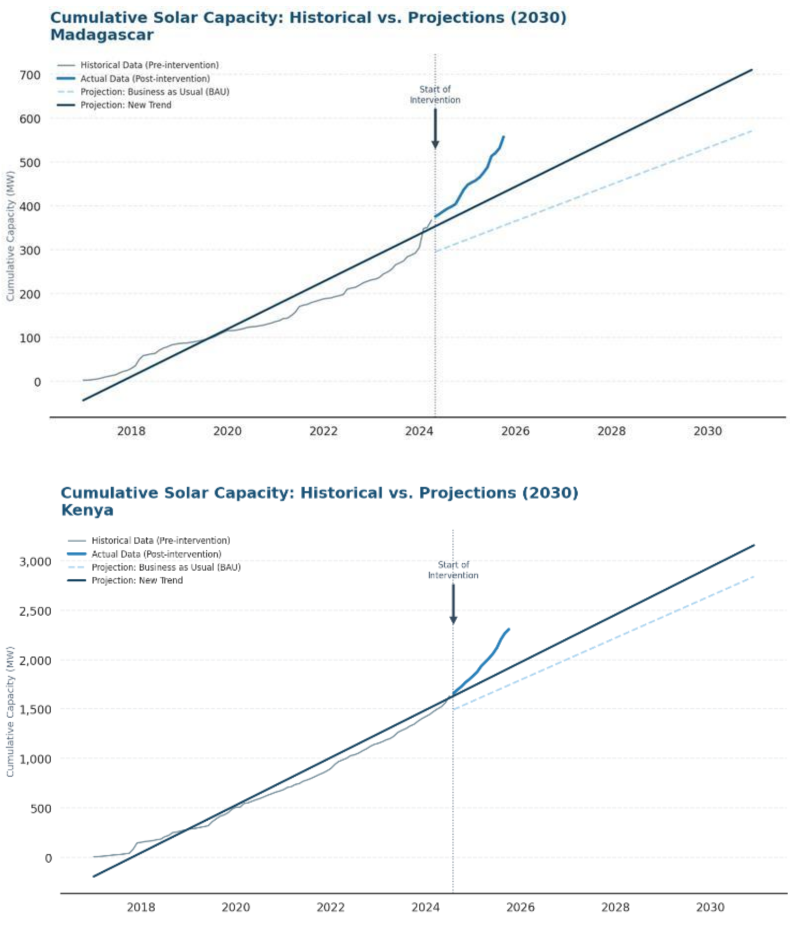
Leveraging on the experience gained from this exercise, Madagascar now plans to clear an accumulation of approximately 10MWs in DG applications forthwith and lift the current freeze on submission of new DG requests. This is expected to support a number of additional industries and economic activities thus also creating opportunities for jobs and investments. A similar exercise in Kenya has resulted in processing of 62 net metering applications amounting to 17MW of capacity. It is expected that with this initiative other cohort countries will also further unlock several MWs of DG, which will in turn support economic development in these countries.

To further illustrate and quantify the impact of the Policy Catalyst approach, a simple comparative impact analysis was conducted by modelling a 'Business as Usual' (BAU) baseline versus an intervention scenario. The BAU trend represents the counterfactual. It is an estimate of what would have happened if the specific intervention had never occurred, for this study the intervention was anchored to the Policy Catalyst's start date which was May 2024 for Madagascar and September 2024 for Kenya . This was done using monthly solar PV module shipment for Madagascar and Kenya[8], and

[8] Ember Energy, 2025

the accumulated capacity (MW) for both countries until 2030 was projected under BAU scenario where no Policy Catalyst intervention was made and under a scenario after this intervention.[9] The results indicate a substantial deviation from the baseline in the post-intervention period, with an estimated capacity surplus of 11% to 20% by 2030 in both markets [10]. Although this surplus cannot strictly be a result of the Policy Catalyst initiative, the data demonstrates a marked improvement in deployment rates following support under the Policy Catalyst window, which can be indicative of a correlation.

FIGURE 4 Cumulative solar capacity projection of Madagascar and Kenya



Source: GET.transform

[9] The core premise of this approach is linearity; it assumes that the historical rate of capacity will remain constant over time without significant changes by future market saturation. So, it's important to note that this model was built to provide a clear and measurable benchmark for strategic planning, primarily accounting for the passage of time and the impact of the specific intervention, if other external variables remain stable.

[10] By converting dates into numerical ordinals, the models calculate a constant growth rate(slope) that is extrapolated into the future, allowing us to quantify the total capacity gained as a direct result of the intervention.

As demonstrated above, the Policy Catalyst approach which brings key regulatory and utility stakeholders from each cohort country together to provide practical training and implementation support on key regulatory buildings blocks for relevant sectors has proven to be very effective.

Beyond the mentioned outcomes, this approach has provided an important platform for stakeholders to not only exchange learnings and knowledge with their peer countries, but also a space for establishing coordination between key national agencies from the same country which may not yet have such a forum available to them. This approach is replicable across different segments and can therefore be streamlined by other TA providers and programmes.

Building on this success and the learnings from the first round of the DG Policy Catalyst Window, GET.transform and its implementing partner SEA have launched a second DG window comprising of 4 countries including Liberia, Senegal, Kenya, and Zimbabwe. In addition to the support outlined in this Impact Study, GET.transform and SEA also plan to further deepen the regulatory technical assistance by providing support in expanding of DG capabilities amongst utility staff, development of wheeling arrangements and tariffs to further bolster the robust and safe growth of the DG sector in Africa.

Distributed Generation can make a vital contribution to the continent's energy goals—unlocking resilience, empowering communities, and paving the way for a more sustainable and inclusive future.

Resources

UNIDO, 2023, International Yearbook of Industrial Statistics

CrossBoundary, 2024, Constructing Africa's Green Economy Requires New Building Blocks - CrossBoundary Energy

Ember Energy, 2025, Ember - The first evidence of a take-off in solar in Africa

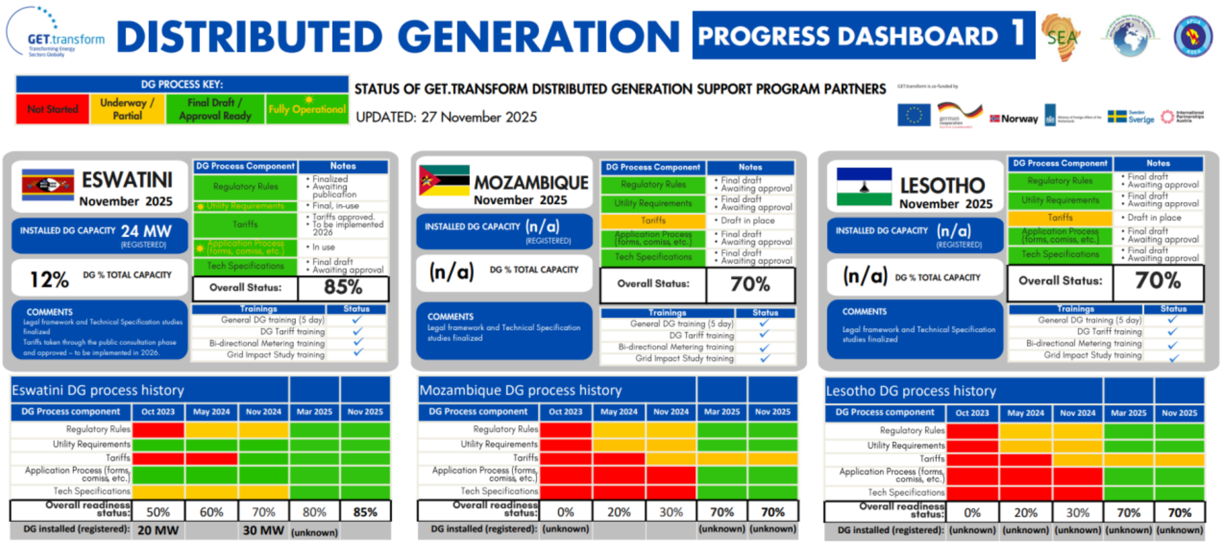
Ember Energy, 2025, China's Solar PV Exports | Ember

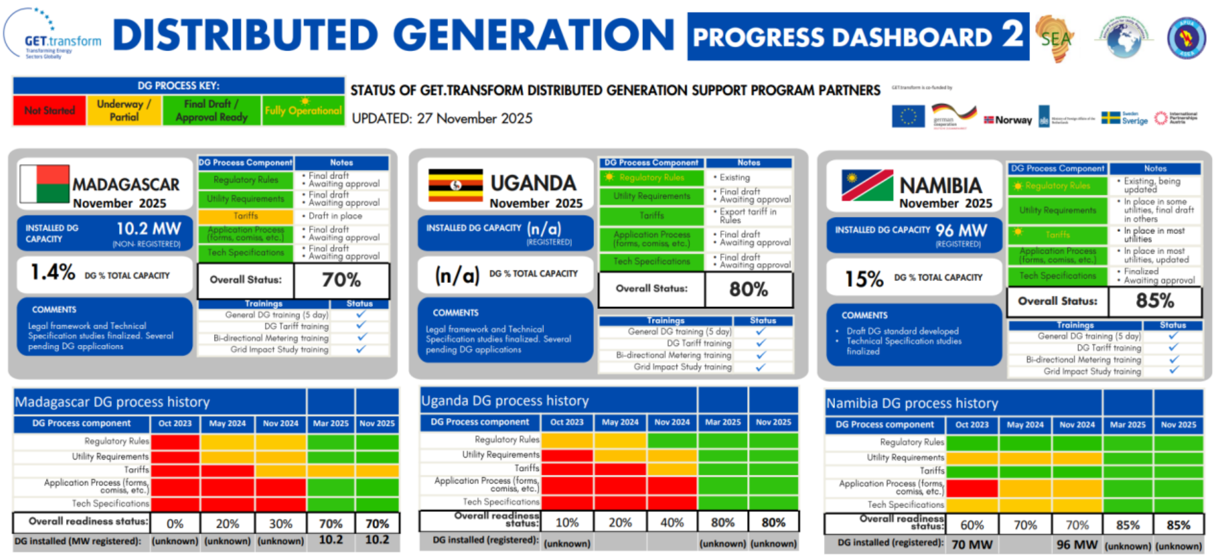
SEA & GET.transform, 2025, Interviews with utilities and regulators from the 10 cohort countries participating in the DG Policy Catalyst Window

Thurber, Nana and Mutiso, 2025, No Subsidies, No Problem: The Organic Rise of Distributed Solar in Sub-Saharan Africa - Energy for Growth Hub

Annex 1

DG progress dashboards for the first cohort countries Eswatini, Mozambique, Lesotho, Madagascar, Uganda and Namibia.





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