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THE BOTTOM LINE

Uganda has just completed the first donor-subsidized competitive bidding program for grid-connected solar photovoltaic (PV) generation in Sub-Saharan Africa. Uganda's GET FiT Solar Facility will provide a performance-based subsidy of USc 5.37/kWh to lower the cost to Ugandan consumers of the electricity produced from four 5 MW solar plants bid by two developers at an average price of USc 16.37/kWh. This note analyzes the bidding process and the lessons learned, for possible replication in other developing countries in Sub-Saharan Africa and elsewhere.

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Promoting Solar Energy through Auctions: The Case of Uganda

Why is this issue important?

As technology prices drop, solar power is becoming an increasingly viable option for even small-scale generators and consumers in Africa

Uganda's recently completed auction for the right of small solar power generators to sell electricity to the main grid is the first successfully completed auction of its kind in Sub-Saharan Africa. Notably, the auction combined price competition with explicit "top-up" payments by donors and the offer of a World Bank partial risk guarantee (PRG) to reduce developers' payment risk.

Why did Uganda decide to hold a solar auction?

Solar generation can help to alleviate short-term power shortages

Despite large drops in the cost of solar photovoltaic (PV) equipment over the past five years, successfully implemented utility-scale solar projects promoted by independent power producers (IPPs) are still a rare phenomenon in the power markets of the region. Most governments have been reluctant to procure privately produced grid-connected solar energy and other forms of renewable energy (RE) because of the expectation that they would unnecessarily raise the cost of generation for consumers connected to the grid. A government willing to take on the financial burden of the higher costs of solar generation through government subsidies or other financial incentives (for example, preferential tax treatment) runs the risk of criticism that the same money could be better spent on more basic needs such as schools, hospitals, and roads rather than the unnecessary luxury of high-cost "green" energy.

These concerns were also present in Uganda, where the average retail tariff was U.S. cents (USc) 16.6/ kilowatt-hour (kWh) in 2013. Government officials believed they could not justify mandating the purchase of relatively expensive electricity generated by solar PV at prices that were likely to exceed Uganda's projected levelized cost of electricity (LCOE) of USc 9/kWh for new long-run sources of main-grid-connected generation. Until late 2012, the government viewed solar PV generation as sensible for only isolated mini-grid locations with relatively high levelized costs of supply. But in late 2012, the government's policy changed: Uganda found itself facing a near-term electricity supply shortage on the country's main grid. Confronted with a choice between buying electricity from expensive online thermal units at prices that were likely to exceed USc 23/ kWh versus lower-cost renewable generation, the government decided to encourage the construction and operation of grid-connected small power producers (SPPs) of solar energy through competitive bidding.

Solar SPPs were especially appealing to the Ugandan government for three reasons. First, they had the potential to come online relatively quickly and alleviate Uganda's expected supply shortage. Second, the European Union (EU), through the EU Africa Infrastructure Trust Fund (ITF), had indicated that it would be willing to provide €15 million in grants (known as top-up payments) to support a competitive bidding program for solar SPPs. Third, competitive bidding could be added as a new activity of Uganda's existing Global Energy Transfer Feed-in-Tariff (GET FiT) program.

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Uganda's GET FiT program (www.getfit-uganda.org) was initially designed to fast-track the development of three types of privately financed, main-grid-connected small renewable generation (hydropower, bagasse, and biomass) in Uganda. The program's announced goal was to promote private investment in about 15–17 small renewable projects that would add about 170 megawatts (MW) to the country's total installed capacity of 840 MW (in 2013). GET FiT was launched in early 2013 as a joint initiative of the Ugandan government, KfW (the German development bank), four European donors (Norway, United Kingdom, Germany, and the European Union), and the World Bank. By formal agreement, the government of Uganda authorized KfW to act as its agent by entering into financing agreements with SPPs and hiring consultants needed to implement the program. In late 2014, the government announced that it would add competitive bidding for grid-connected solar PV generators as an additional component of the GET FiT program.

The European donors agreed to provide funds for "top-up" or premium payments that would be added to the feed-in-tariffs (FiTs) set by the Electricity Regulatory Authority (ERA). Donors would pay for the top-up payments, and Ugandan electricity consumers would pay for the FiTs. In addition, SPPs were offered the possibility of purchasing a World Bank PRG that could protect a developer from three risks, including the risk of delayed payments for the electricity sold to the Uganda Electricity Transmission Company Limited (UETCL), the government-owned enterprise that was designated to purchase the output of all SPPs.[1] In effect, this component of the risk guarantee mechanism is a form of insurance to protect against delayed payments.

Table 1. Feed-in-tariffs and donor top-ups for 1–20 MW of installed capacity, by technology

Technology	Current REFiT tariff (US$/kWh)	GET FiT premium (US$/kWh)	Maximum capacity factor (%)
Hydro (9–20 MW)	0.085	0.014	60
Hydro (up to 9 MW)	0.115–0.085	0.014	60
Bagasse	0.095	0.005	0
Biomass	0.103	0.01	40
Solar/PV	0.11	0.0537	0

Note: Premiums calculated for 20-year payment period but disbursed in first 5 years of plant's operation. For solar, top-up payments calculated as the difference between the accepted bid price and feed-in tariff set by ERA.

Before introducing competitive bidding on solar PV SPPs under the GET FiT Solar Facility, the GET FiT program had already conducted two rounds of procurement without price competition for hydropower, biomass, and bagasse SPPs with capacities between 1 and 20 MW. In these nonsolar procurements, developers competed based on a system scoring their performance in three areas: financial and economic, technical and organizational, and environmental and social. Developers also had to document compliance with the International Finance Corporation's (IFC's) Performance Standards (PS) for Environmental and Social Sustainability.[2] *There was no competition on price, which was prespecified in the FiTs (known as renewable energy feed-in-tariffs [REFiTs]) set by the regulator.* The applications were appraised and ranked on nonprice factors by an independent expert team, and the results were submitted for final consideration to an independent Investment Committee comprised of international RE and infrastructure investment experts with experience in Sub-Saharan markets. This meant that the final evaluation and selection was made by the Investment Committee and not by the multistakeholder Steering Committee, the regulator (ERA), or the UETCL (the entity that would be buying the electricity from the SPPs).

A unique feature of the GET FiT program for both solar and nonsolar projects is that donor-funded top-up payments are loaded at the front end. This means that a developer will receive a per kilowatt-hour premium for the full projected 20-year output of a plant, but these top-up payments will be totally disbursed during the first five years of the plant's operation (table 1). To receive the first 50 percent of the total top-up payment amount upon commercial operation, the plant must pass a performance test conducted by an independent expert team. The remaining 50 percent is paid in annual 10 percent tranches over the first five years of operation

1. The other two risks were guaranteeing commercial lenders against debt service default (a loan guarantee) and a guarantee against termination of payments if triggered by certain specified default events (a termination of payment guarantee).
2. The International Finance Corporation's Performance Standards have become the international *de facto* "gold standard" for environmental and social impact assessments and mitigation schemes across all types of infrastructure investments. Many private and development finance institutions now require compliance with the IFC PS as a condition for approving loans or equity investments, even in the absence of IFC financing.

against energy delivered and production targets achieved. Hence, the selected developers receive higher payments during the crucial early years of operation when they will have the added costs of making interest and principal payments on loans.

The front-loaded disbursement also has an advantage for donors. Donors' priorities change as their governments' priorities change. Consequently, most donor organizations are not able to make credible financial commitments for a long time period. However, even shorter commitments—for example, seven years for the GET FiT program—may still be vulnerable to changes in foreign exchange rates (for example, if commitments are made in euros, and top-up payments are promised in U.S. dollars).

"The entire bidding process—from the initial request for proposals to the selection of the winners—took approximately 10 months. The bidding was conducted without an announced price cap. Bidders were given a one-time opportunity to submit a sealed, written price bid. The winners were told that they would be paid the price that they bid."

What were the challenges faced in Uganda's auction for solar generation?

One key challenge was balancing the interests of small generators with concerns for the integrity of overall grid capacity and service

The ERA decided that a total of 20 MW of solar capacity would be procured through competitive bidding. This limit reflected concerns about the ability of the grid to handle a large amount of intermittent capacity as well as a donor funding limit for top-up payments earmarked for the GET FiT Solar Facility. Bidders were asked to submit bids for plants with a peak capacity of 5 MW and allowed to submit up to two bids, for a total of 10 MW.

Prior to the bidding, the ERA announced a FiT of USc 11/kWh for the electricity produced by the winning solar generators. This was not ERA's estimate of the levelized cost of producing electricity from solar generators. Instead, it represented the regulator's estimate of a tariff that could be paid by UETCL and that would ensure limited impact on its average supply costs and, in turn, on the bulk supply tariff that UETCL charges the distribution entities that purchase from it. The GET FiT Solar Facility's top-up payments would then cover the difference between the winning bid prices and this USc 11/kWh tariff.

Another challenge posed by auctions is the time required to review bids. In the case of Uganda, *the entire process—from the initial request for proposals to the selection of the winners—took approximately 10 months*. The bidding was conducted without an announced price cap. Bidders were given a one-time opportunity to submit a sealed, written price bid. The winners were told that they would be paid the price that they bid. Developer proposals were evaluated both on price bids and on various technical, financial, environmental, and social parameter scores. The nonprice factors were similar to those used in GET FiT's earlier nonprice competitions.

The bidding took place in three stages. In the first stage, announced in early 2014, developers were invited to submit an expression of interest documenting their experience with solar projects in developing countries and their general financial capacity. Developers were told that they had to demonstrate previous experience in the construction, operation, and financing of similar solar plants in developing countries. In early May 2014, qualified developers (9 out of 24) were invited to submit technical and price bids. These selected developers were given three months to submit their bid package in the second stage. Seven developers submitted their bid package in late August 2014. An external team of consultants evaluated and scored the price and technical bids, which covered the project´s proposed technology and design elements as well as predefined financial, environmental, and social parameters. The price bids received a 70 percent weight and nonprice elements received a 30 percent weight. The selection of two winning bidders was announced at a press conference on December 10, 2014.

Regarding another key challenge—maintaining a tight implementation schedule—the solar SPPs benefitted from a standardized power purchase agreement (PPA) and implementation agreement (IA) that had been drafted and approved by the Ugandan authorities for small hydropower SPPs. Both documents were the outcome of an extensive and transparent consultation process that received numerous comments from both domestic and external stakeholders, including representatives of international RE investors. The earlier agreements were then adapted for solar PV SPPs relatively quickly.

In contrast to the earlier nonsolar procurement processes, the tender documents for the solar procurement identified preferred zones for the location of the proposed plants. These zones were defined after a review of grid capacities, local loads, and solar radiation rates. Before the prequalification stage, ERA's and UETCL's technical teams analyzed the available capacities of existing power

lines and substations, and simulated the operational impact of solar-based generation at various locations. The tender documents also stated that projects had to be located no farther than 3 kilometers (km) from the grid and that all interconnection costs were to be borne by the bidder and included in tariff bids.

The appraisal of the submitted project bids and the final selection decisions were conducted by external consultants. Outside consultants were used for three reasons. First, Uganda lacked experience with competitive bidding and solar PV generators. Second, the use of independent, international experts helped to ensure that selected projects were technically consistent with international industry standards. Third, the fact that the selection decisions of the Investment Committee could not be overturned by governmental authorities or the multistakeholder GET FiT Steering Committee helped to ensure procurement integrity. Uganda is not alone in its extensive use of outside international consultants. All four rounds of the successful South African Renewable Energy Independent Power Producer Program (REIPPP) relied heavily on external expert support.

"The fact that the selection decisions of the Investment Committee could not be overturned by governmental authorities or the GET FiT Steering Committee helped to ensure procurement integrity."

Two winning bidders were selected with an average levelized tariff of USc 16.37/kWh, well below the initially anticipated levels of USc 18/kWh. Both winning developers bid 10 MW in total by providing bids for two side-by-side 5 MW plants. As of October 2015, one SPP has signed transaction agreements and is about to achieve financial close in a matter of days. The due diligence review of lenders (all development finance institutions, DFIs) are almost complete and the loan agreements ready for signing. The financing agreements with KfW and the government for GET FiT support have been signed with one SPP. The other SPP is in the process of achieving full compliance with investment preconditions,[3] which were imposed by the Investment Committee to close any remaining quality gaps for the two selected projects. It is anticipated that both projects will start construction in the fourth quarter of 2015—about 20 months after the start of the tender process. Current projections are that the projects will reach commercial operation by the second quarter of 2016, or slightly over two years after expressions of interest were requested. If they become operational in time and produce the projected amount of electricity, they will achieve the government's original goal of reducing purchases from more expensive fossil-fuel units.

"The donor top-up payments will account for a third of the revenues of the winning bidders and will enable Uganda to acquire grid-connected solar PV power with negligible impact on retail tariffs."

3. For the solar photovoltaic (PV) projects, such conditions included review of the engineering plan for joint operation of the two side-by-side 5 MW plants and completion of remaining studies required for the IFC PS.

What are the key lessons from Uganda's solar auction?

Competitive bidding can be combined with donor grants keyed to the output of small power producers

Under the GET FiT Solar Facility in Uganda, SPPs will receive a donor-funded premium payment of USc 5.37/kWh on top of a FiT of USc 11/kWh. Hence, the donor top-up payments will account for a third of the revenues of the winning bidders and will enable Uganda to acquire grid-connected solar PV power with negligible impact on retail tariffs. The performance-based structure of the top-up payments (that is, keyed to verified electricity production) will be made when the plants come online and produce electricity. After the top-up grants have been paid out, it is projected that a 20-year revenue stream of USc 11/kWh under the PPA will provide a sufficient incentive for developers to continue operating plants in later years. This avoids the risk of one-time investment tax credits, which is that developers will take the credit, stop producing, and move their solar facilities to another location.

The Ugandan bidding process placed considerable emphasis on "due diligence" to ensure that the projects were economically feasible, the project sponsors had relevant experience, and the projects would be able to meet the IFC PS. In addition, bidders had to post bid and performance bonds. The intent was to avoid selecting low-ball "briefcase" developers offering proposed projects that had no realistic chance of coming to closure.

Price levels. The Uganda competitive bidding process produced lower than anticipated prices: the winning average price of USc 16.37/kWh was well below the initially expected levels of USc 18/kWh. Yet some international stakeholders have expressed disappointment with this outcome. They point to lower average winning bid prices in other countries: USc 6.4/kWh (June 2015) in South Africa, USc 5.98/kWh (November 2014) in Dubai, USc 8.7/kWh (November 2014) in Brazil, and USc 8/kWh (February 2014) in the state of Madhya Pradesh, India.

The obvious question is: why are the winning bids in Uganda higher than in these other countries? We think that there are four plausible explanations:

This was Uganda's first experience with grid-connected solar generation. If Uganda's solar SPPs are successful, it is likely that future projects will be bid at lower prices.

"One disappointment is that commercial banks have been unable or unwilling to provide loans to SPPs.... Without project financing from commercial banks, SPPs will have to continue to depend on loans from DFIs, which is not a commercially sustainable long-term solution."

- First, the winning solar generators in these other countries are much larger (for example, about 75 MW on average in South Africa and 100 MW in Dubai). Uganda intentionally chose smaller-sized solar generators so that the solar-produced electricity could be accommodated on UETCL's existing transmission and distribution (T&D) system. But this meant that the "soft costs" of preparing a bid (for example, legal reviews and studies required by the IFC PS), which are often roughly the same for small- and medium-sized projects, would be spread over fewer kilowatt-hours of expected production.[4]
- Second, the creditworthiness of the off-taker, UETCL, is relatively weak, though it has been improving since the introduction of cost-reflective end-user tariffs in 2012.
- Third, this was Uganda's first experience with grid-connected solar generation. If Uganda's solar SPPs are successful (that is, they produce their targeted electricity outputs and receive timely payments), it is likely that future projects will be bid at lower prices. This has been the experience in almost every other country that has had multiple bidding rounds.
- Fourth, Uganda will always have somewhat higher prices because it is a landlocked country with higher transportation costs for imported equipment.

In our view, the most relevant comparison is with signed contract prices with small-scale solar generators in other African countries. For example, the USc 16.37/kWh price in Uganda is about 34 percent lower than the negotiated USc 25/kWh price paid for an 8.5 MW solar PV system over 25 years in Rwanda. As a general rule, we think that more confidence should be placed in market tests rather than consultants' estimates. Consultants' estimates generally tend to be higher because their sources are often developers who know that their supplied cost estimates can raise the FIT prices that they will receive. For example, at the same time (August 2014) that Uganda received average bids of USc 16.37/kWh, a consultant recommended to the Tanzanian regulator that the minimum required price for a similarly sized solar generator should be USc 24.5/kWh. Hence, the market price in Uganda was more than 33 percent lower than the consultant-recommended price in neighboring Tanzania. (It is not surprising that the Tanzanian regulator recently announced that electricity purchased from future solar SPPs must be acquired through competitive procurement rather than administratively established FiTs.)

Financing. One disappointment is that commercial banks have been unable or unwilling to provide loans to SPPs on a project-financed basis. An objective of the GET FiT program was to persuade commercial banks, whether local or international, to provide such loans to winning SPPs. To date, this has only been achieved for three GET FiT–promoted hydropower projects. All other loans are being given by donor-supported DFIs.

Why? It is generally believed that the DFIs offer the SPPs better loan terms—lower interest rates, longer loan terms, and lower collateral requirements—than commercial banks are willing or able to provide. In addition, Ugandan banks generally lack project finance experience for RE transactions. Also, local commercial banks can make higher profits, with less work, and at lower risk by focusing loans on familiar sectors (such as real estate and agriculture).

Without project financing from commercial banks, SPPs will have to continue to depend on loans from DFIs, which is not a commercially sustainable long-term solution.

Payment risk. In Africa, a major concern of SPPs selling to government-owned buyers is that they may not get paid for the electricity that they produce, or that payments will be delayed. Delayed payments are also a concern for lenders who provide loans to solar developers. If the developer does not receive timely payments from the buyer, the developer will find it difficult to make interest and principal payments on the bank loan that financed the project. And since the loans are made on a project-financed basis, the lender will not have recourse to a parent company's balance sheet.[5]

The PRG offered by the World Bank in Uganda was meant to deal with the issue of delayed payments. Yet, to date none of the GET FiT SPPs have applied for the guarantee. Several explanations have been given. One is that the DFIs that are offering loans to SPPs do not need the assistance of the World Bank to get their loans repaid. Presumably, DFIs can apply pressure directly on the government, and thus on UETCL, to ensure timely payments to the SPP borrowers.

4. One bidder estimated that its bid preparation costs were $30,000. The costs for a 5 MW and 10 MW bid did not vary significantly.

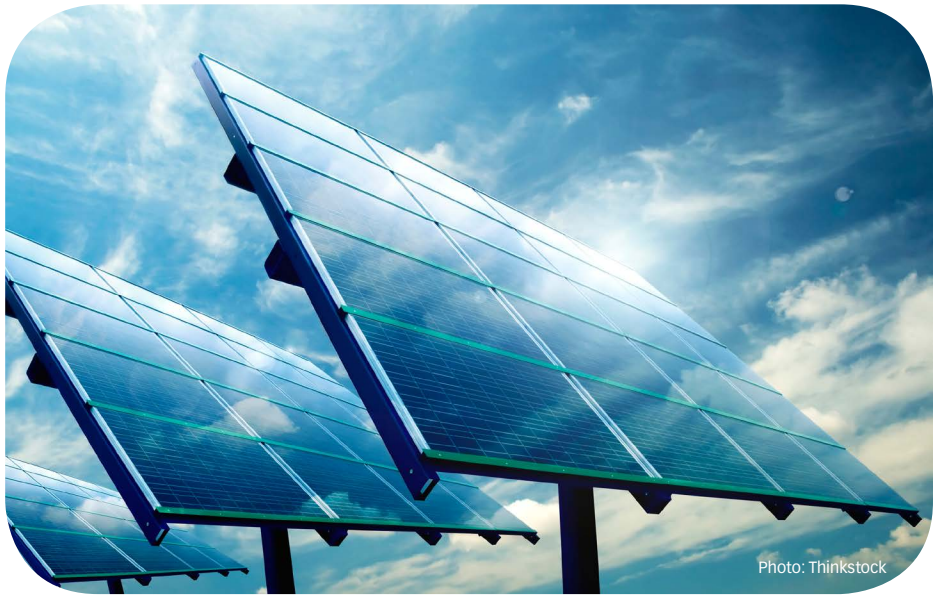
5. In Tanzania, over the last 18 months, small renewable power producers have experienced delays of 5 to 7 months in payments for the electricity that they supplied.

"Uganda took a hybrid approach to selecting a location. Tender documents for the solar SPPs identified preferential zones. Bidders were informed that they would receive additional points if they chose plants in these zones. This policy generated the desired results: all seven project proposals submitted were within the preferred zone."

Furthermore, the up-front $100,000 initiation fee for the PRG may be too high for SPPs.

"Must take" provisions. Another developer concern is that any "must take" provision in their PPA will be ineffective unless the buyer has an explicit legal obligation to pay for power that the SPP was capable of producing but the buyer was not able to receive. SPPs, unlike larger IPPs, usually do not receive capacity charges for being "ready" and "available to produce." Instead, the revenue streams of SPPs depend primarily on energy (that is, kilowatt-hour) charges. To reduce the risk that SPPs will lose revenue, certain PPA provisions state that whenever the SPP is able to produce electricity, the buyer must take or pay for this electricity even if the buyer is not willing or able to receive the SPP's electricity. Given the weaknesses of transmission systems in many Sub-Saharan countries, the practical issue is: what happens if the buyer is physically unable to receive the kilowatt-hours produced by the SPP?

Tanzania and Uganda have taken different approaches in answering this question. In Tanzania, the Tanzania Electric Supply Company Limited (TANESCO), the national utility, is not required to make any payments to SPPs if it is unable to receive the SPP's electricity because of delays in constructing new distribution or transmission facilities or operational problems after the facilities have been built. Uganda has taken another approach. There, the government has agreed to make so-called deemed commissioning payments to SPPs if a needed distribution or transmission facility has not been built in time to receive an SPP's power. And if the facility is in place but operational problems prevent UETCL from receiving the SPP's electricity, then the PPA requires UETCL to make deemed energy payments if UETCL was cumulatively unable to receive the SPP's electricity for more than 176 hours in a 12-month period or if it was the result of "political force majeure." Such provisions, however, raise two questions that must be decided: First, was the buyer or seller at fault? And second, how much electricity could the SPP have produced if the buyer had been able to receive the SPP's electricity?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T&D availability. New generation projects usually trigger the need for new investments in substations and T&D lines to safely receive electricity from the new generators. But the specific investments needed to strengthen the T&D systems will not be known until after the location of the generator (whether an SPP or an IPP) has been determined. This has been a problem in South Africa, China, and Brazil, where operations of renewable generators selected through competitive bidding were delayed because the T&D facilities necessary to receive the winning bidder's electricity had not been built or expanded in time. Uganda has had somewhat more success. Any "shallow" investments (for example, to connect to the nearest substation) are the clear responsibility of the SPP. And the "deep" investments that require upstream strengthening of the grid are UETCL's responsibility. But the lesson learned from other countries is that it is hard to know in advance where the "deep" investments should be made if bidders have complete freedom in deciding where their proposed plants should be located.

Uncertainty about accompanying investments in T&D is less of a problem where bidders are restricted to a specific location (that is, in site-specific bidding) or are told that they will receive higher scores if they locate in a preferred zone. For example, in Namibia

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and Rwanda, bidders were informed that they had to bid for plants at preselected project locations where the government had already secured land titles and where it had been determined that adequate T&D capacity was available to receive an SPP's production. An even more proactive approach is for the government to establish "solar parks" where it ensures that land titles, environmental permits, and adequate transmission capacity are in place prior to seeking bids. This approach has been used successfully in the Indian states of Gujarat and Rajasthan.

Uganda took a hybrid approach to selecting a location. Tender documents for the solar SPPs identified preferential zones.[6] Bidders were informed that they would receive additional points if they locate plants in these zones. Together with the requirement of being a maximum distance of 3 km from the existing grid, this policy generated the desired results: all seven project proposals submitted were within the preferred zone.

Two recommendations. Many changes have been proposed to achieve better outcomes (that is, faster procurement and lower prices) in future competitive SPP procurements in Uganda. We have two specific proposals:

- **Screening on nonprice factors should take place before the final bidding round.** The final bidding round should be limited to only price bids. In Uganda, the solar bidders were judged on a mix of price (70 percent) and nonprice (30 percent) factors in the final bid round. An alternative approach would be to set minimum thresholds on the nonprice factors in the earlier stages. Any developer that achieves the minimum thresholds on nonprice factors would then be asked to submit a price-only bid in the final round. This modification of the existing bidding system has two advantages. First, it continues to ensure that bids will be received from credible, experienced bidders whose projects are screened for potential environmental or social damage. Second, a price-only bid in the final round is likely to lead to lower bid prices.
- **Whenever possible in the future, governments should consider establishing solar parks and limiting bidding to these areas.** The rationale here is that the government is in a better position than private developers to acquire land titles and environmental permits, and to ensure adequate transmission capacity for solar generators. But this presumes certain preconditions: land titles are clear and uncontested, the government has the will and the budget to acquire the needed land, and the land purchases can be made quickly with little risk of delays or inflated prices. It is not clear that these preconditions exist in Uganda or in most other Sub-Saharan African countries. Until they are, it is probably best to continue to rely on potential bidders to acquire the land needed for their projects. One obvious exception would be if the needed land is already owned by a government-owned utility or agency.

6. This was different from the approach used in South Africa. In South Africa, bidders of renewable generation were allowed to locate proposed plants anywhere in the country.

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