

EEG Energy Insight

Best practice in renewable energy auctions design and implementation – a global review

The use of auctions (also called competitive tenders or bidding) for procuring new renewable energy capacity is growing rapidly, both globally and in sub-Saharan Africa. An analysis of auction programmes in Latin America, Europe, Asia, and the Middle East and North Africa region has shown that renewable energy auctions can be effectively implemented in various contexts, but require a specific combination of auction design and implementation factors to ensure the achievement of low prices and high project realisation rates. These factors include measures to ensure bidder capacity and commitment, project de-risking and credit enhancement by the procurer, and adequate institutional capacity within government.

Written by Prof. Anton Eberhard and Wikus Kruger

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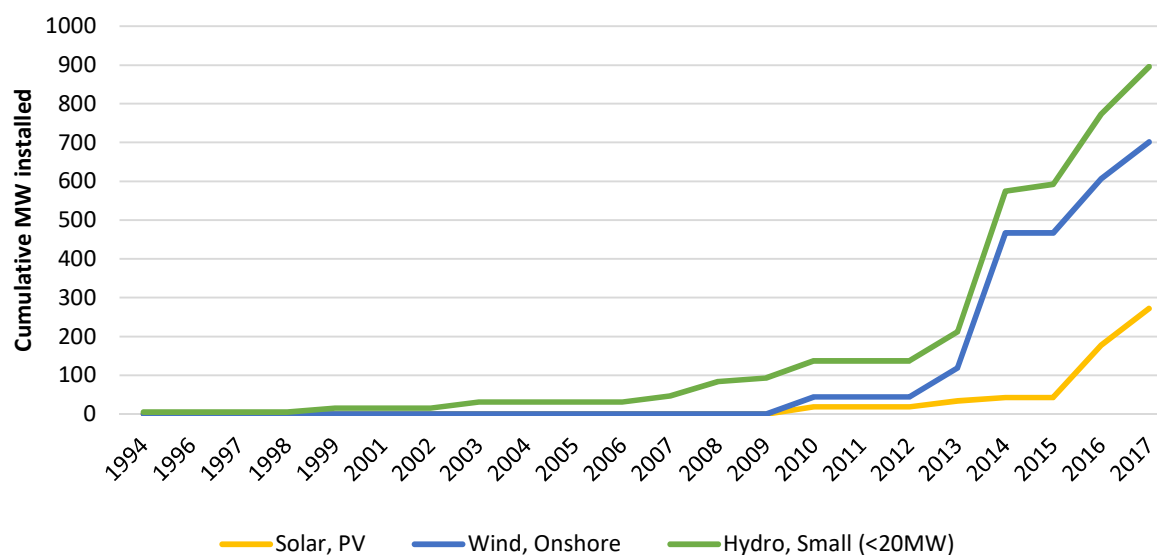


Introduction

The Applied Research Programme on Energy and Economic Growth (EEG) is a five-year programme, led by Oxford Policy Management and funded by the UK Department for International Development. It aims to address pressing policy questions in low-income countries to help shift energy systems toward a more sustainable, efficient, reliable, and equitable paradigm. The EEG programme is funding research, capacity building, and technical assistance on renewable energy auction design and implementation in sub-Saharan Africa as one of its core research projects. The goal of this study is to substantially improve the design and implementation of renewable energy auctions in sub-Saharan Africa to accelerate investment in clean energy technologies and ultimately mitigate climate change. It builds on the South African renewable energy independent power project (IPP) procurement programme, which has been particularly successful.

Sub-Saharan Africa is in desperate need of more electricity, with the entire region having less installed generation capacity than Spain (African Development Bank Group, 2017; IEA, 2014). Independent Power Projects (IPPs) – built, financed, owned, and operated by the private sector – have become one of the fastest-growing sources of investment in the region’s power sector (Eberhard *et al.*, 2016). Recent data show that a rapidly growing portion of these IPPs is renewable energy-based (Figure 1), many of which have been competitively procured (Kruger and Eberhard, 2018). These three trends – the surge in private power investment, the growth in competitively priced renewable energy projects, and the use of competitive procurement (auctions) for IPPs – represent important departures from the status quo in the sub-Saharan region.

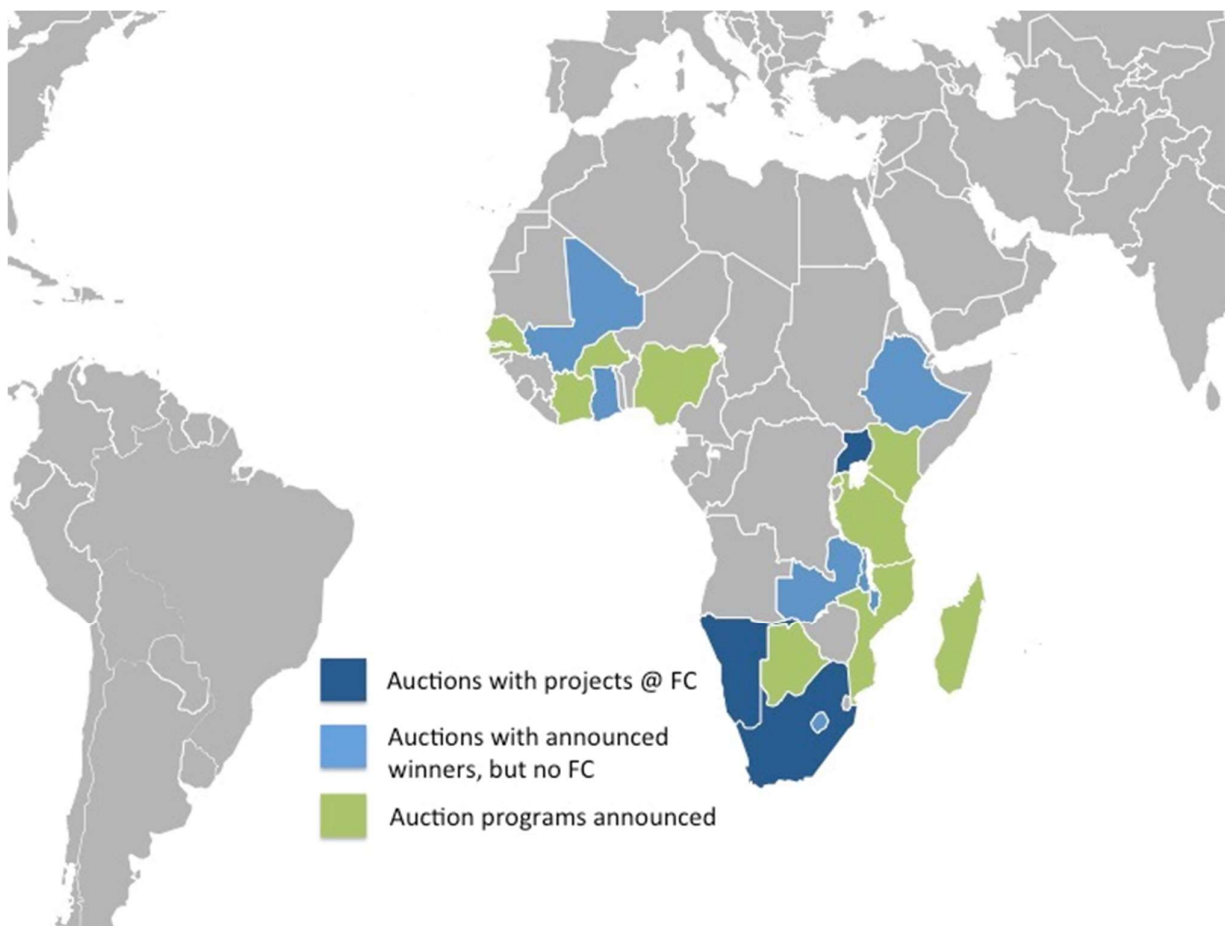
Figure 1: Cumulative private (IPP) MW installed for solar photovoltaic (PV), onshore wind and small hydro, 1994–2017 in sub-Saharan Africa



Source: authors' calculations

Auctions, although quite recent, have already delivered more investment in renewable energy at lower prices than any other procurement or contracting method for the region. In sub-Saharan Africa, at least 18 countries are currently in the process of developing and implementing a renewable energy auction programme; more than half of these programmes were launched in 2017 alone. Many African countries have struggled to successfully address the risks and costs involved in renewable energy auctions, resulting in potentially poor outcomes. Additionally, many countries are desperate for affordable power generation investment, yet cannot afford the 'school fees' involved in a poorly designed and implemented auction programme. There is thus an important need to learn from and distil current experiences with renewable energy auction programmes for the African context.

Figure 2: Countries in sub-Saharan Africa using renewable energy auctions



Note: FC = projects having reached financial close

Findings, results, and policy implications

Auctions are now officially the preferred procurement method for contracting renewable energy capacity globally, and are set to grow in prominence. Despite the costs and risks involved, more than 67 countries worldwide have embarked on, or are busy developing, renewable energy auctions – up from five countries in 2005 (REN 21, 2017). The rising prominence of auctions is primarily due to the introduction of competition into the procurement process, causing significant downward pressure on renewable energy project prices. The lowest renewable energy prices globally are currently being announced in auctions in developing countries (Dobrotkova *et al.*, 2018). The result is that the least-cost new-build electricity generation capacity options in many developing countries are now renewable energy based (McCrone *et al.*, 2017; CSIR, 2016; Dezem, 2016).

Our analysis of renewable energy auction programmes in Latin America, the Middle East and North Africa, Europe, and Asia has revealed seven

major trends with important implications for sub-Saharan Africa:

1. **Renewable energy auctions work in many different market contexts with various renewable energy technologies.** Auctions have been able to secure large volumes of privately financed, built, owned, and operated renewable energy capacity while at the same time reducing prices – often to levels below a power system’s average cost of supply or below the cost of new-build conventional power sources. Auctions have been shown to work in numerous types of electricity markets: from fully unbundled, liberalised power systems, such as in Brazil, Chile, and the EU, to hybrid systems dominated by vertically integrated, state-owned utilities, such as in the UAE and Morocco. While solar PV and onshore wind dominate renewable energy auction programmes, recent experience has shown that auctions are also able to successfully procure technologies such as concentrated solar power (CSP) and offshore wind (and to a lesser degree biomass and hydro).

Renewable energy auctions are well suited to most sub-Saharan African power sectors, where competition for long-term power purchase agreements can easily be integrated with existing regulations and structures. Sub-Saharan African countries are also advised to focus on proven technologies such as solar PV and onshore wind, at least in initial auction rounds. These technologies have seen rapid decreases in costs, can be deployed quickly, and are not as beholden to economies of scale as various other conventional power sources. An important caveat is the use of storage technology: given the small size and fragility of many sub-Saharan African grids, it might be essential to integrate storage as part of the auctioned product to achieve sufficient scale that does not threaten grid stability.

2. A coherent, clear integration of energy policy, electricity sector master planning, and procurement is essential for achieving successful auction outcomes.

Auction volume and rounds need to be clearly linked to renewable energy targets as well as sector planning frameworks (including transmission planning). This provides predictability to investors and enables the procurer to implement auction rounds with some regularity, which has proven to consistently drive down prices and develop a pipeline of strong projects. It might be wise to start relatively small to test the auction framework.

Sub-Saharan African governments and regulators are advised to develop renewable energy auction programmes based on least-cost, dynamic integrated resource plans. Overall auction volumes, technology-specific tranches and frequency of rounds should be established by these plans. Given the relatively small and weak grids in most sub-Saharan African countries, it is also imperative that auction design takes into account transmission capacity and planning.

3. Auction participants need to not only have the capacity (financial, technical, etc.) to stand behind their bids, but more importantly should be committed to realising auction outcomes.

The use of stringent qualification criteria, right-sized financial guarantees (e.g. bid and performance bonds), and effective penalty mechanisms has ensured high project realisation rates. In the absence of these mechanisms, auction programmes have been subject to speculative bidding and underperformance (e.g. in India and Peru). *Sub-Saharan African auctioneers would be well advised to use an effective combination of qualification criteria, bidder guarantees, and*

penalty mechanisms to ensure adequate bidder capacity and commitment to project realisation.

4. Most renewable energy auctions tend to favour simpler, more intuitive design options such as, for example, capacity-based volumes (MW), energy-based payment (MWh), and sealed bid processes with pay-as-bid pricing rules. While there have been various innovative design options used (e.g. bidding for time blocks in Chile; bidding for various energy products in Mexico; hybrid bidding procedure in Brazil), these have tended to be concentrated in quite advanced electricity markets and depend on the sophistication of procurers and bidders.

Nevertheless, these design innovations point the way to the electricity markets of the future, and show us how electricity auctions might have to adapt to these new realities.

A simple, straightforward auction is likely to not only be easier to implement but will probably also attract greater bidder interest. Given the relatively high transaction costs of auctions for bidders and auctioneers, it is suggested that at least the first few rounds of auctions be implemented using tried-and-tested auction design options. That being said, the need for auction innovation around potential additional products such as energy storage might prompt some sub-Saharan African auctions to introduce auction design elements that have not been used in other contexts.

5. Deciding beforehand on clear auction objectives is important, since there tends to be a trade-off between different objectives.

Price reduction is of course one of the main objectives of an auction programme, but policymakers need to be aware that adding additional objectives such as local industrialisation and community ownership requirements will affect auction pricing. Local content requirements in particular need to be realistic. Too often, renewable energy auction programmes saddled with additional political objectives are criticised for either not delivering low prices, or for not achieving the additional objectives.

While the overwhelming need in most sub-Saharan African countries is for additional, competitively priced electricity capacity, there are also various other socioeconomic needs that must be met. Where sub-Saharan African countries choose to use, say, local content requirements in their renewable energy auctions, they need to ensure that these requirements are realistic and will add value through being integrated in a broader national industrialisation strategy.

6. Project de-risking and credit enhancement have proven to be important for achieving lower prices, and for ensuring project realisation.

Various auction programmes have used payment and loan guarantees, offered concessional financing, and provided other fiscal incentives to drive down the cost of debt for projects. Some offtakers have even provided substantial amounts of equity. One of the most frequently used risk mitigation measures has been the provision and preparation of the project site, along with the relevant infrastructure, permits, and data.

For many sub-Saharan African countries, the only way to ensure that private power projects are bankable is by providing guarantees (usually sovereign, but also payment guarantees) and other credit enhancement mechanisms. An auction makes it possible to provide these benefits at a programmatic level (as opposed to a case-by-case basis), and to ensure that only the best (winning) projects benefit from scarce government resources.

7. Effective renewable energy auction implementation requires substantial institutional capacity and commitment at various levels of government.

It is important to have a credible, capable procurer (often the sector regulator or system operator) that is able to coordinate multiple institutions; a credible (if not credit-worthy) and committed offtaker (government utility, intermediary offtaker, or distribution companies); and high-level political support. Auction rules and procedures should be clear and evaluation needs to be done transparently. A well-designed auction programme that is poorly implemented will struggle to realise effective outcomes.

Renewable energy auctions in sub-Saharan Africa need to be well resourced to ensure that the procuring entity is able to effectively implement and coordinate the auction programme. Offtaker commitment can be ensured through dedicated equity participation in the project company. Ensuring that projects are procured and built within an electoral cycle can strengthen political commitment.

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About the authors

Prof. Anton Eberhard is Emeritus Professor and Senior Scholar at the University of Cape Town's Graduate School of Business, where he directs the Management Programme in Infrastructure Reform and Regulation. His research and teaching focuses on power sector investment challenges, governance, and regulatory incentives to improve utility performance, and the political economy of power sector reform, in sub-Saharan Africa. He has worked in the energy sector across sub-Saharan Africa (and other developing regions) for more than 35 years.

Wikus Kruger is a Research Fellow with the University of Cape Town's Graduate School of Business. His research and teaching focuses on investment challenges in the African power sector, primarily in the context of Renewable Energy Auctions. Wikus has more than 10 years' experience working in the African energy sector as a researcher, consultant, and business developer.