Solar Can't Scale in the Dark

Why lessons about subsidies and transparency from IFC's Scaling Solar Zambia can reignite progress toward deploying clean energy

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Executive summary

In 2016, Zambia's utility-scale solar auction set records by achieving tariffs as low as 6 US cents per kilowatt hour. Zambia was the first country to sign up for the IFC's Scaling Solar Program, which aimed to be a one-stop shop for African governments seeking to build solar capacity. The World Bank Group's official messaging emphasized the role of best practices in Zambia's auction success. The results, they claimed, were even more meaningful because they involved no explicit or implicit subsidies.

Scaling Solar itself did not scale. Although thoughtfully designed, only three countries completed projects under the program (in addition to Zambia, solar projects were built in Senegal and Uzbekistan). More broadly, the initiative did not fulfill its grand vision of providing a demonstration model that could be replicated widely.

Nor did it scale the broader solar market it intended to catalyze. Despite falling prices and rapid global expansion, Sub-Saharan Africa (ex-South Africa) remains a laggard. The region of over 1 billion people has built only one-third of the solar capacity of South Africa (population 62 million), a country famous for chronic electricity load-shedding.

This paper re-examines the record of the IFC's Scaling Solar in Zambia to uncover policy-relevant insights that can help reignite progress toward clean, affordable energy for all. It concludes that Scaling Solar was a well-designed development finance program tackling a challenging issue. However, official messaging undermined the program's goals by denying or downplaying the critical role of explicit and implicit subsidies in Zambia's success. This distorted price signals for African governments and solar developers. Poor messaging also undercut the case for the expansion of concessional lending vital in bringing down the cost of capital and making solar projects financially viable in lower-income countries.

The paper concludes by proposing three actionable steps the IFC could take to return to the original vision of the Scaling Solar initiative:

1. Acknowledge that expanding clean power access will continue to rely heavily on concessional DFI lending and guarantees to reduce the cost of capital.
2. Transparently report explicit and implicit subsidies.
3. Innovate to enhance power contract transparency, empowering market participants to scrutinize pricing drivers and prevent the accumulation of large undisclosed public debts.

Introduction

The promise of cheap solar in Sub-Saharan Africa

In 2016, a utility-scale solar power auction in Zambia set records for Africa's cheapest solar power to date. Its success bolstered hopes of a new era of abundant, affordable, and quick-to-deploy clean energy in Sub-Saharan Africa, home to three-quarters of the world's 775 million people living without electricity.[1] The UN Sustainable Development Goals (SDGs), launched the previous year, target universal access to affordable and clean energy by 2030.

As the price of solar power plunged globally, large developing countries like India, Brazil, and South Africa rapidly expanded solar capacity at ever-lower tariffs. This elevated hopes that low-cost renewables could quench the surging demand for electricity in the emerging world.

Zambia's auction was the first of the International Finance Corporation's (IFC) new Scaling Solar program, launched in 2015, which sought to be a one-stop shop for African governments seeking to build utility-scale solar capacity. The IFC projected that the project would provide power for tens of thousands of households and businesses and save the Zambian Government hundreds of millions of dollars over 25 years.[2] The IFC's CEO, Philippe Le Houérou, declared, "It is now possible for governments across Sub-Saharan Africa to look first to solar power as a solution for inexpensive, quick-to-build power—something unimaginable outside of South Africa until now."[3] The IFC announced that Scaling Solar would target developing one gigawatt of solar by 2019.

In a TED Talk viewed over 100,000 times, former World Bank President, Jim Yong Kim, praised Scaling Solar Zambia as a successful example of the World Bank Group's ability to catalyze private sector investment towards sustainability goals simply by introducing best practices such as competitive auctions, and de-risking projects.[4]

[1] Cozzi et al., "For the First Time in Decades, the Number of People without Access to Electricity Is Set to Increase in 2022"; IEA, "SDG7 Database - Data Product."

[2] World Bank Group, "Unlocking Low-Cost, Large-Scale Solar Power in Zambia."

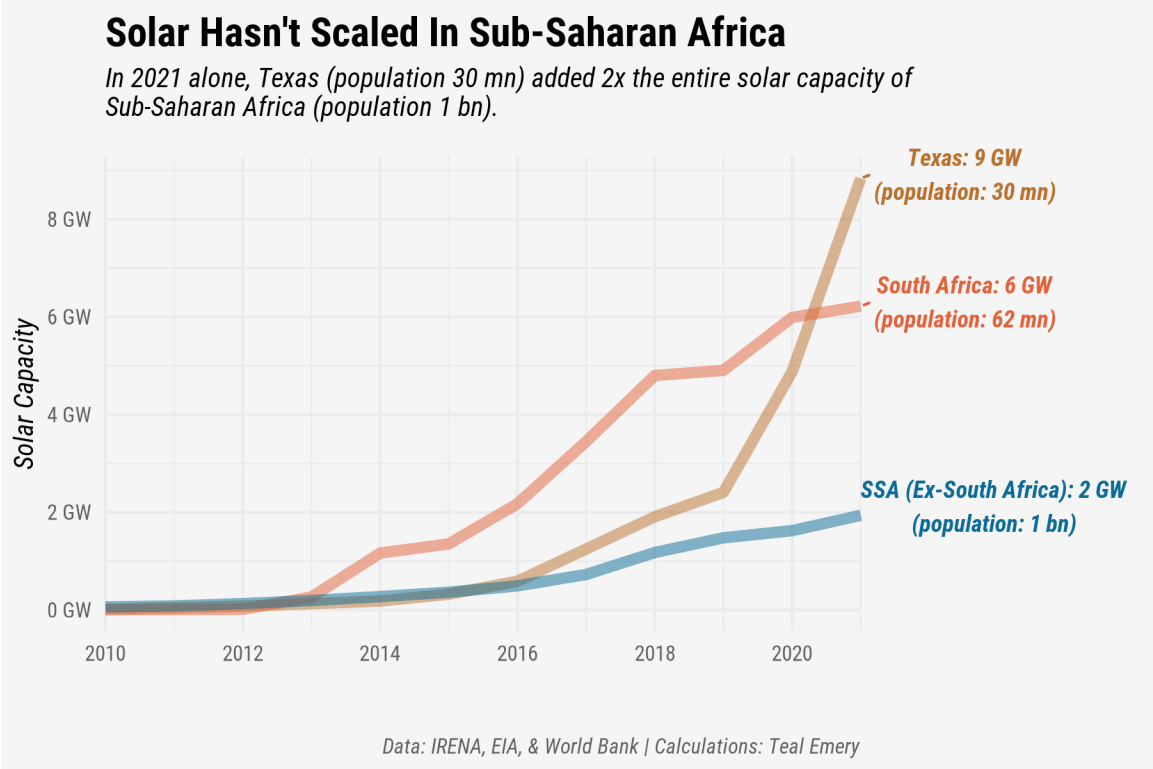
[3] IFC, "Scaling Solar Delivers Low-Cost Clean Energy for Zambia."

[4] Kim, "Doesn't Everyone Deserve a Chance at a Good Life?" Kim's discussion of Scaling Solar in Zambia begins at approximately minute 16. De-risking is a euphemism for subsidizing projects using guarantees, insurance policies, and below-market financing.

Solar can't scale in the dark

Eight years after its launch, IFC's Scaling Solar had only completed projects in three countries – a 75-megawatt plant in Zambia in 2019, a 60-megawatt facility in Senegal in 2021, and a 100-megawatt plant in Uzbekistan in 2021 – with a combined capacity modestly larger than rooftop solar in the IFC's hometown of Washington, DC.[5] Despite plentiful equatorial sunshine, falling equipment prices, and massive additions to solar capacity globally, Sub-Saharan Africa continues to lag as a global outlier in solar development. With a combined population of over a billion people, the region (ex-South Africa) has developed only one-third of the solar generation capacity of South Africa – a country of 62 million people, famous for its power system dysfunctions.[6] In 2021 alone, Texas added four gigawatts of capacity, twice Sub-Saharan Africa's existing two gigawatts of solar capacity.

Figure 1



[5] IFC, "Scaling Solar"; IFC, "IFC Project Information & Data Portal"; US Energy Information Administration, "EIA - District of Columbia - State Profile and Energy Estimates." Total completed based on the countries listed as "Successful Projects" on the Scaling Solar website and the IFC Project Information & Data Portal as of April 2023: Zambia 75.7 megawatts + Senegal 60 megawatts + Uzbekistan 100 megawatts = 235.6 megawatts. The EIA reports Washington DC rooftop solar contributes 155 megawatts of capacity, two-thirds of Scaling Solar's completed capacity additions.

[6] IRENA, "Renewable Capacity Statistics 2022"; IMF, "World Economic Outlook Database, October 2022." Solar data through 2021. Population statistics from IMF. Calculations by author.

This paper re-examines the experience of IFC's Scaling Solar in Zambia in order to provide policy-relevant insights into why, seven years after Zambia's record-breaking auction, IFC's Scaling Solar had such limited success in its goal of scaling utility-scale solar power in Sub-Saharan Africa.

The IFC's Scaling Solar attacked a difficult problem with a high potential for development impact. No program, however well-designed, can single-handedly solve deeply entrenched development challenges. Nevertheless, this paper identifies concrete lessons about subsidies and transparency that can inform policymakers and investors dedicated to expanding affordable clean energy access in Sub-Saharan Africa.

This paper argues that IFC's Scaling Solar is an ambitious and thoughtfully designed development finance program undermined by senior leaders' desire to shield essential details and instead tell a magical story where a pinch of best practices and a dash of de-risking would catalyze the trillions of private sector dollars needed to fulfill the SDGs.[7] Poor messaging and confidential contract terms kept solar developers and African governments in the dark about the drivers of Zambia's low prices, hampering market development and contributing to governments canceling solar deals that could not reach the low prices advertised by IFC.

This paper uses publicly available data to show that cheap DFI debt financing was a primary driver of Zambia's record low tariffs. It argues that the high risk premium demanded by private investors for financing utility-scale solar deals in poor countries results from genuine credit risk, not unfamiliarity with deal structures that will fade with time. Utility-scale solar is unviable at market interest rates in lower-income countries and is not being built. Projects that are unviable at market interest rates but have a high developmental impact are exactly where DFIs should be focused. However, DFIs need to shine a light on key deal terms if they hope for a regional market to develop.

Part I of the paper unravels the lessons of Scaling Solar Zambia by asking three big questions.

Part II identifies policy-relevant conclusions and suggests three policy recommendations the IFC can take to reinvigorate progress on expanding utility-scale solar in Sub-Saharan Africa.

[7] Kenny, "Billions to Trillions Is (Still) Dead. What Next?"

Part I: Three big questions

1. How was Scaling Solar supposed to work, and how did it work in Zambia?

The opportunity

The creators of the Scaling Solar program believed that the market for utility-scale solar power in Sub-Saharan Africa was a missed opportunity.[8] Falling equipment costs, repeated auctions, and competition caused significant solar tariff declines and rapid solar capacity increases in larger middle-income economies such as South Africa, Brazil, and India in the mid-2010s. Yet despite abundant sunshine and hundreds of millions of people lacking electricity, Sub-Saharan Africa (ex-South Africa) saw minimal solar power development.

Three factors that contributed to this investment gap included:

- Lack of a unified regional approach to renewables procurement.
- Small market size.
- The poor financial health of state-owned off-takers.

Scaling Solar sought to apply the lessons from successful emerging market solar buildouts to create a regionally scalable and rapidly implementable model adapted for the challenges of poorer, more fragmented markets.[9]

The fundamental challenge was to minimize the cost of capital. According to Dan Croft, one of Scaling Solar's designers, the cost of capital is the critical price differentiator for solar projects.[10] Utility-scale solar had grown commoditized. Solar resources are the same for all bidders on a given project. The cost of equipment is similar. The critical lever is the cost of capital, which is not the same for all bidders. For this reason, he believed it was essential to create a process that would attract top-tier global solar developers that built hundreds of megawatts of projects each year and enjoyed a very low cost of capital with correspondingly low hurdle rates for projects.

Scaling Solar sought to combine multiple services from across the World Bank Group to provide a one-stop shop to enable top-tier developers to familiarize themselves with a

[8] Fergusson, Croft, and Charafi, "Making the Sun Work for Africa."

[9] Eberhard, Kolker, and Leigland, "South Africa's Renewable Energy IPP Procurement Program: Success Factors and Lessons." Outlines many of the lessons from South Africa's successful experience.

[10] The Zenergy Podcast, "Dan Croft | Founder of Scaling Solar Program, International Finance Corporation by The ZENERGY Podcast." This intuition about the importance of the cost of capital is supported by research by the World Bank and the IEA on the economics of solar.

single process and set of project documents that would allow them to bid on solar projects across the region.[11] The Scaling Solar package included:

- **Project preparation:** The IFC's advisory arm acted as transaction advisor to the government, doing all aspects of project preparation and due diligence.
- **Competitive bidding:** IFC provided technical assistance to the government in running competitive auctions.
- **Bidder vetting:** Developers had to submit to a rigorous prequalification round to mitigate execution risk for auction winners.
- **Financing:** To assure developers that the projects were bankable, the IFC offered to finance the winning bidders.
- **Guarantees:** The World Bank's International Development Association (IDA) offered guarantees to mitigate the financial risk of signing long-term power purchase agreements (PPAs) with cash-strapped state-owned electricity utilities.
- **Political risk insurance:** The World Bank's Multilateral Investment Guarantee Agency (MIGA) offered political risk insurance to bidders to protect against expropriation, breach of contract, or war.
- **The promise of rapid implementation:** Scaling Solar targeted 20 months from signing the initial agreement to the start of operations.[12]

By reducing project uncertainty, credit risk, and document negotiation, the process aimed to focus developers' energy on sharpening their bids based on their capital cost and ability to control operational costs. As project developers grew comfortable with the process and the project documents, Scaling Solar's designers envisioned the growth of a regional market with sufficient scale to draw in more competition. As the regional market developed, IFC's involvement would diminish.

Scaling Solar Zambia

In August 2015, the Zambian Government announced that it had signed an agreement to tender for 100 megawatts of solar capacity through Scaling Solar.[13] The project was split into two 50-megawatt tenders to manage risks and increase competition. IFC acted as the government's advisor, assisting them extensively with all aspects of project preparation and due diligence, such as site selection, grid capacity studies, and hiring external advisors where necessary.

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[11] IFC, "Scaling Solar: The Complete Package"; IFC, "Scaling Solar." Summary primarily adapted from these sources.

[12] IFC, "Scaling Solar: The Complete Package." On page 4: 8 months for preparation, structuring, and procurement; 4 months for financing; 10 months for implementation.

[13] IFC; World Bank Group, "Zambia Scaling Solar - Project Paper"; World Bank Group, "Zambia Scaling Solar - Implementation Completion and Results Report" provide the basis for the summary in this section.

The IFC assisted the government in the tender process. In November 2015, 11 bidders out of an initial 48 survived the prequalification round. Seven groups submitted final bids in May 2016. The following month, two winning bidder consortiums were announced. A consortium of Neoen, a French company, and First Solar, a US company, bid 6.02 cents per kilowatt hour to build a 54-megawatt plant. Enel Green Power, a company partially owned by the Italian Government, bid 7.84 cents per kilowatt hour for a 34-megawatt plant. Both projects would be built next to each other on land provided by the government in an industrial park with a good grid connection located south of Lusaka, the country's capital.

The projects' financial close faced minor delays but was still quick by regional standards. The Zambian Government retained a 20% interest in the project companies through its Industrial Development Corporation (IDC), with the bidder consortiums providing the remaining $24.5 million of equity investment. Multilateral and bilateral DFIs provided 100% of the $81 million debt financing at rates not publicly disclosed.[14] IDA provided payment guarantees totaling $5.7 million to offset the financial risk of signing a 25-year offtake agreement with ZESCO, the financially ailing state-owned utility. IFC provided interest rate swaps to mitigate interest rate risk. Bidders were offered MIGA political risk insurance but did not take it. USAID's Power Africa provided $2 million to pay project fees for the Zambian Government.[15]

In the background, Zambia's macroeconomic environment deteriorated rapidly during this period. Public debt ballooned from 36% of GDP in 2014 to 100% in 2019, triggered by exogenous shocks, such as persistent droughts and low copper prices, and domestic political economy dynamics that fueled high fiscal deficits.[16] The COVID pandemic was the final straw pushing the country into sovereign default in November 2020. In 2017, Zambia signed a second Scaling Solar mandate targeting up to 500 megawatts over several rounds. While an initial prequalification round in May of 2017 prequalified 12 bidders, the process was put on hold indefinitely due to ZESCO's financial troubles.

In 2019, both solar plants began power production. While the latest data from the energy regulator show that both projects continue to produce power, it is unclear from public data whether the two Scaling Solar PPAs are part of the Republic of Zambia's $1.2 billion in PPA arrears it reports as of the end of June 2022.[17]

Scaling Solar failed to scale. Zambia served as the pilot project. Senegal joined Scaling Solar in February 2016 and successfully began operations on 60 megawatts of solar

[14] Both projects received debt financing from IFC and the IFC – Canada Climate Change Program. The Enel project received debt financing from the European Investment Bank. The Neoen/First Solar program received funding from OPIC (now DFC).

[15] USAID, "Review Study of the Zambia Scaling Solar Program – Final Report"

[16] IMF, "World Economic Outlook Database, October 2022."

[17] Republic of Zambia, "End June 2022 - Public Debt Summary"; Zambia Energy Regulation Board, "Statistical Bulletin: January to June 2022."

capacity five years later in 2021 at tariffs under 4 cents per megawatt hour.[18] In May 2018, Uzbekistan was the first country outside of Sub-Saharan Africa to sign up for Scaling Solar. Masdar, a company owned by the Emirate of Abu Dhabi, developed a 100-megawatt capacity solar plant that began operations in August of 2021 at a tariff of 2.7 cents per megawatt hour.[19] These are the only three countries that completed projects in the eight years since Scaling Solar's launch. It has not catalyzed a regional market as it originally intended, and it has not yet succeeded in completing a second round of projects in any country. After the second round of Scaling Solar fell through in Zambia, the Government appears to have returned to unsolicited tenders, signing a memorandum of understanding for 200 megawatts of solar capacity with a company headquartered in a suburban strip mall outside Atlanta.[20]

The project lives on with more modest ambitions. As of early 2023, Scaling Solar's website lists six active projects. Some, such as a second round in Uzbekistan, appear to be moving forward. Others, such as Madagascar, seem to have hit roadblocks.

2. How did Scaling Solar achieve record low tariff prices in Zambia?

The primary driver of Zambia's record low tariff rates appears to be a heavily subsidized cost of capital from DFI debt financing. Yet the details remain shrouded in opacity. Much of the information necessary to conclusively evaluate the auction results is not publicly disclosed.

Lack of contract transparency hinders public understanding

Scaling Solar introduced meaningful process innovations, such as competitive auctions and comprehensive project preparation. These may have contributed to low tariff rates. However, to conclusively assess the financial impact of these process improvements, one would need data about land costs, capital costs, and other information contained in the PPA and associated contracts between the Republic of Zambia, the national utility, and the bidding companies. The IFC does not disclose these contracts as it deems them commercially sensitive.[21] Nor does the IFC include this information in the extensive public disclosure it publishes for all projects upon completion.[22]

Explicit and implicit subsidies drive low tariffs

Bidders justifiably feared nonpayment. The winning bidder would sign a 25-year offtake agreement with ZESCO, the state utility. As noted above, Zambia faced mounting

[18] IFC, "Scaling Solar." Information in this paragraph from the IFC's Scaling Solar website as of January 2023.
[19] IFC, "Scaling Solar."; Masdar, "100 MW Nur Navoi Solar Project".
[20] Ultra Green Corporation, "200 MW Solar Power Plant – Ongoing". The address listed as the head office on the company's website appears to be a UPS Store located in a strip mall anchored by a Publix supermarket.
[21] IFC, "International Finance Corporation Access to Information Policy."
[22] World Bank Group, "Zambia Scaling Solar - Implementation Completion and Results Report."

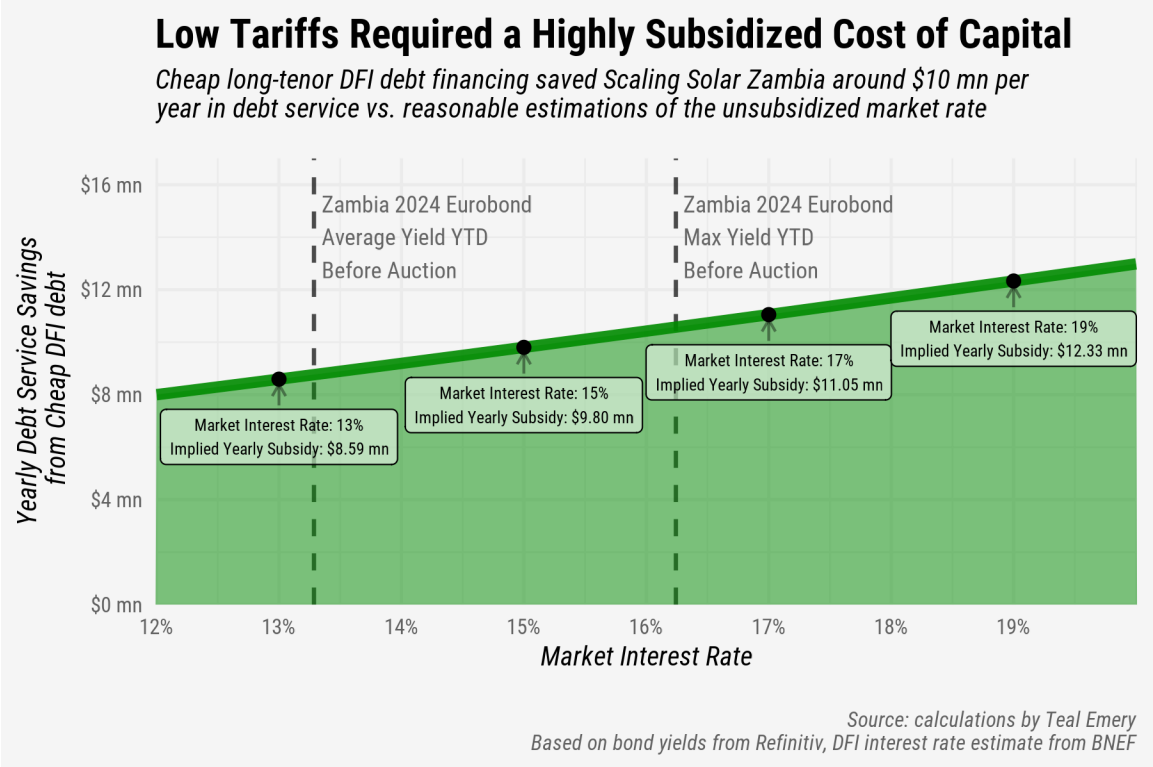
economic distress. In the months before the auction, the Zambian Government's US dollar bonds traded at yields as high as 16.2%, implying market participants feared a sovereign default.[23] By 2017, ZESCO ran arrears of $500 million, threatening the overall sustainability of the power sector.[24]

This deal was unviable for private investors at the published prices without at least three types of explicit subsidies and three types of implicit subsidies.

Subsidy 1 (explicit): Cheap debt financing from DFIs

A Bloomberg New Energy Finance report analyzing the Zambia auction results concludes that they could only make their project finance model fit the announced tariffs if they assumed a highly subsidized cost of debt financing from DFIs.[25] In the absence of transparent information about the other relevant pricing factors, this explanation is compelling.

Figure 2



[23] Bond data from Refinitiv. Zambia's 2024 USD Eurobond traded at a bid yield of 16.2% on January 21, 2016. Zambia's bonds traded at distressed levels for significant periods before the pandemic finally pushed the country into default in November 2020.

[24] World Bank Group, "Zambia Scaling Solar - Project Paper." See page 3, paragraph 10 for a discussion of ZESCO's financial distress.

[25] Chase, "Analyst Reaction: Scaling Solar for Africa: Zambia's 6-Cent PV."

The interest rate and tenor on the DFI loans are not disclosed, but using reasonable assumptions, cheap DFI debt financing implies an approximately $10 million yearly subsidy. A simplified model provides an order-of-magnitude estimate by calculating the payments for the deal's $81 million debt financing at different interest rates and tenors.[26] DFIs lend at lower interest rates and longer tenors than private lenders. Bloomberg New Energy Finance estimated the interest rate on DFI financing at 6%.[27] Assuming the DFI loan tenor matches the PPA (25 years), yearly debt service costs would be $6.3 million. Since private lenders would be taking ZESCO counterparty credit risk, the non-subsidized interest rate would be priced at a risk premium above the interest rate on Zambia's USD bonds.[28] This conservatively puts the borrowing costs in the mid-teens.

Furthermore, private lenders likely would not have lent for tenors longer than Zambia's 10-year Eurobonds unless they received a significant risk premium. The yearly debt service payment on an $81 million 10-year loan at 15% interest is $16.1 million. This figure is nearly $10 million a year more in debt service than a reasonable estimate of DFI debt service costs.

Quantifying the magnitude of the subsidy from DFI lending is informative but purely intellectual. The project was unviable at market interest rates. Projects with high development value that are unviable at market interest rates are exactly where multilateral and bilateral development finance lenders should be lending. They should, however, be transparent about the subsidy provided if they hope for the market to scale.

Subsidy 2 (explicit): Post-Award tax renegotiation

USAID's project evaluation of Scaling Solar claims that Neoen deliberately submitted an aggressive bid and then successfully renegotiated the terms with the IDC and the Zambian Government afterward, giving Neoen tax incentives beyond those offered to all bidders in the auction.[29] USAID claims this should have disqualified the Neoen bid and triggered appropriate performance penalties. It argues that Enel also engaged in post-award tax renegotiations. The report claims that IFC had an incentive not to push back on the post-award renegotiation both because the IFC would not get paid until financial close and because "IFC would have been embarrassed if they had had to announce that the record

[26] If you think other interest rate assumptions are more reasonable, you can easily do these calculations in Excel or a financial calculator.

[27] Chase, "Analyst Reaction: Scaling Solar for Africa: Zambia's 6-Cent PV."

[28] The author was an emerging markets debt investor covering Zambia during this period. Eskom, South Africa's ailing state-owned electricity utility, often has had borrowing costs significantly higher than the government's borrowing cost. This would likely be true for ZESCO as well.

[29] USAID, "Review Study of the Zambia Scaling Solar Program – Final Report". Pp. 31-33. To avoid misrepresenting USAID's conclusions in their Scaling Solar project review, the relevant sections from the final report (pages 31-33) are excerpted in Appendix 2.

low tariffs announced with great fanfare were in fact artificially low and not real level-playing-field transparent tariffs."[30]

Appendix 2 excerpts the relevant section of USAID's final report at length.

Subsidy 3 (explicit): IDA payment guarantee

IDA provided a payment guarantee of $5.7 million USD, nearly a quarter of the private developers' total $24.5 million equity investment.[31] This provided a large cushion to ensure the project companies get paid on time and in full.

Subsidy 4 (implicit): Extensive project preparation by IFC

IFC advisory services provided extensive project preparation support. The Project Implementation and Completion Report notes $668,020 in staff costs.[32] USAID's Power Africa paid $2 million on behalf of the Zambian Government in fees upon financial close. It is unclear from public documents whether this represents the total cost of project preparation.

Subsidy 5 (implicit): Halo Effect political risk mitigation

Multilateral and bilateral lenders provide meaningful implicit political risk mitigation, sometimes called the *Halo Effect* in project finance textbooks.[33] Defaulting on the World Bank, the European Investment Bank, or the US Government has a higher economic and diplomatic cost than defaulting on a private company. Multilaterals enjoy preferred creditor status in restructurings.[34] These lenders can apply direct pressure on governments, and defaulting on them would endanger other sources of cheap financing.

The *Halo Effect* concretely benefited Scaling Solar in Zambia. The World Bank Implementation Completion and Results Report describes how World Bank and IFC teams coordinated to directly monitor and intervene to ensure ZESCO's payments to the two developers. As a result, ZESCO accumulated arrears towards other larger, more expensive IPPs while continuing to pay for the Scaling Solar projects.[35] From public records, we do not know whether the government defaulted on these claims after the implementation report was published.

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[30] USAID, pp. 32-33.

[31] World Bank Group, "Zambia Scaling Solar - Implementation Completion and Results Report."

[32] World Bank Group. See page 35.

[33] Clifford, *Project Finance: Applications and Insights to Emerging Market Infrastructure*. See page 71 for a discussion of the *Halo Effect* of multilateral lender involvement.

[34] Cordella and Powell, "Preferred and Non-Preferred Creditors."

[35] World Bank Group, "Zambia Scaling Solar - Implementation Completion and Results Report." On page 23 it says: "ZESCO continued to make payments to the Scaling Solar IPPs, close to or on the due dates, but accumulated arrears toward other larger and more expensive IPPs. Due to the deteriorating financial viability, ZESCO has been making payments 'at the last minute', sometimes requiring World Bank Group engagement to ensure that the payments are made on time."

Subsidy 6 (implicit): Land costs

According to the 2017 Scaling Solar Project Paper, the IFC helped the government choose a project site near an existing large electricity substation, providing sufficient capacity to deal with the power supplied by the new solar plants and substantially reducing costs.[36] Unlike the other subsidies mentioned, this comes from the government. Nevertheless, it's an essential element driving the deal's economics where the public is left in the dark.

3. Did Scaling Solar's messaging undermine its goals?

Scaling Solar's official messaging resembles the trope of the businessperson who, when interviewed, proclaims the virtues of hard work, determination, and innovative practices in their success but fails to mention the multi-million-dollar start-up loan they received from their family. It doesn't mean the hard work, determination, and innovative practices weren't meaningful. But it buries the lede and can skew market perceptions of the drivers of success – with damaging implications for market development.

Understanding the messaging: Billions to trillions

The 2015 launch of the UN Sustainable Development Goals (SDG) envisioned a central role for multilateral development banks in transforming billions of dollars of official development assistance (ODA) into the estimated trillions of dollars of investments needed to fulfill the SDGs by catalyzing private finance.[37] The strategy formally agreed upon at a conference in Addis Ababa, Ethiopia, in June 2015 was called *Billions to Trillions*.

Global stakeholders pressured the World Bank Group's leadership to demonstrate results in the agenda's objective of catalyzing private investment to meet sustainability goals. This context appears to have driven the official messaging about Scaling Solar. A World Bank official blog post praising the auction in Zambia exemplifies the narrative. Zambia's auction results were significant because "there aren't any implicit or explicit subsidies involved in the deal."[38] It asserts that the World Bank Group "simply helped structure the auction based on the best global practices – taking into account local specifications and providing a guarantee to back-stop the obligations of the national utility to pay for the electricity being supplied." Press releases, President Jim Kim's widely viewed TED Talk, and other official messaging parroted this narrative.

[36] World Bank Group, "Zambia Scaling Solar - Project Paper." Land cost discussed on page 13.

[37] African Development Bank et al., "FROM BILLIONS TO TRILLIONS: MDB Contributions to Financing for Development"; Development Committee, "FROM BILLIONS TO TRILLIONS: TRANSFORMING DEVELOPMENT FINANCE POST-2015 FINANCING FOR DEVELOPMENT: MULTILATERAL DEVELOPMENT FINANCE."

[38] Sargsyan, "Why Zambia's 6 Cents Is More Significant than Dubai's 3 Cents."

In contrast, the Scaling Solar project team themselves have reflected thoughtfully in reports and interviews about the lessons learned and the real-world realities of the program.[39] But these insights are mostly buried deep on the World Bank Group's website.

Getting the prices wrong

Scaling Solar's official messaging undermined the program's goals in two ways.

First, it skewed market expectations. Misleading messaging hampered solar market development less reliant on explicit and implicit subsidies. Multiple participants involved in the African solar market during this period report disappointment and consternation amongst African governments and project developers unable to match Scaling Solar's purportedly unsubsidized low tariff rates.[40] The deal economics no longer made sense for project developers compared to other investment opportunities. The low advertised tariffs caused some countries to back out of other existing deals with developers. In 2018, Nigeria's Minister of Finance, Kemi Adeosun, cited Zambia's lower tariffs as a reason for canceling 14 solar IPPs priced at 11.5 cents per kilowatt hour.[41] Counterfactuals can't be proven, and the real world is complicated. Nevertheless, economic theory supports these claims. If the actual price of developing solar power was higher than the low prices trumpeted by the IFC, this misperception might have restricted the supply of solar power in Sub-Saharan Africa by misaligning government and developer expectations. The empirical fact that only token additions to solar development have been made in much of the region in the seven years since the Zambia auction further supports participants' claims.[42]

Second, the messaging undermined the case for the concessional finance that was critical for the program's success in Zambia. If six-cent solar can be achieved in Sub-Saharan Africa without explicit or implicit subsidies, why should DFIs lend scarce concessional dollars to these projects? This framing perpetuates a myth that with some good advice and a little guarantee, small amounts of DFI capital can catalyze large sums of private investment. In reality, in Zambia, $1 of DFI financing catalyzed 28 cents of private sector financing. Private investment was additive, but it was not multiplicative.

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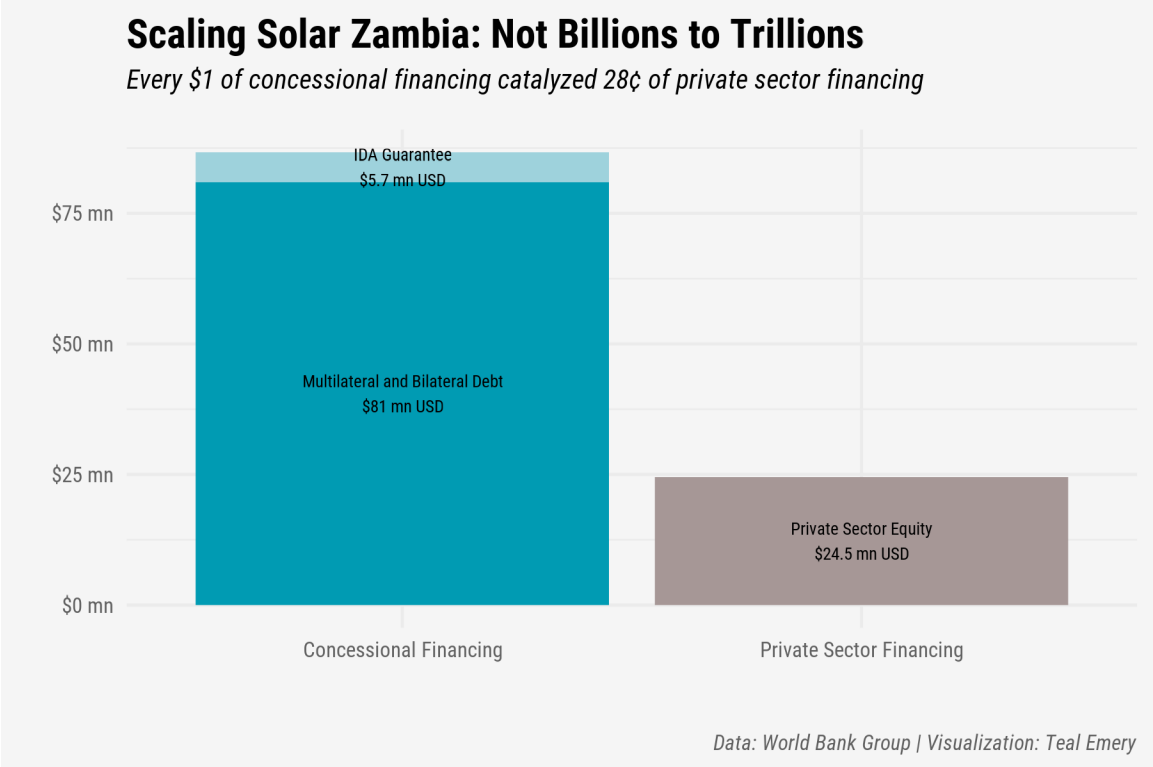
[39] World Bank Group, "Zambia Scaling Solar - Implementation Completion and Results Report"; World Bank Group, "Zambia Scaling Solar - Project Paper"; IFC, "Scaling Solar: The Complete Package"; The Zenergy Podcast, "Dan Croft | Founder of Scaling Solar Program, International Finance Corporation by The ZENERGY Podcast."

[40] Multiple professionals involved in African solar during this period made remarks about this on background. Given their jobs and their continued interaction with the IFC, all expressed a desire for their comments to remain *not for attribution*.

[41] Bungane, "Nigerian Gov Continues to Battle Tariff Structure with Solar IPPs"; Akanonu, "How to Resolve the Tariff Disputes Blocking Nigeria's Solar Project Pipeline?"

[42] See Figure 1 on page 5 for an illustration of magnitude.

Figure 3



Part II: Policy relevant lessons

Learning the right lessons from IFC's Scaling Solar in Zambia

This paper tries to provide a balanced appraisal of the experience of IFC's Scaling Solar in Zambia to provide policy-relevant insights to understand why utility-scale solar power has not scaled in Sub-Saharan Africa in the seven years since Zambia's record-breaking auction.

The IFC's Scaling Solar program is a thoughtfully designed development finance program that identified key bottlenecks to building a regional market for solar power in Sub-Saharan Africa and developed a plan to deliver cheap and affordable power. Even the best-designed program cannot single-handedly overcome all entrenched challenges blocking clean energy access, such as financially ailing off-takers, limited grid connectivity, and political economy issues.

Scaling Solar intended to help build a regional market for utility-scale solar in Sub-Saharan Africa. Two elements hindered governments and solar developers from understanding the drivers of the prices achieved in Zambia.

First, information critical for assessing the deal's economics is buried in the PPA and related contracts, which are not publicly disclosed. This is standard industry practice. But it is an area where the IFC is well-placed to innovate to improve. Creating transparency in power contract terms would allow market participants to understand deal terms and aid utility-scale solar market development. It also matters because, as Zambia's $1.2 billion in PPA arrears demonstrate, PPAs constitute a contingent liability of the government hidden from public view.

Second, the official World Bank Group messaging undermined the nascent market's ability to understand the drivers of Scaling Solar Zambia's low tariffs. The messaging masqueraded a thoughtfully designed development finance program as a market-led solution.

While key deal terms remain opaque, the available evidence points to a highly subsidized cost of capital as the most potent driver of Scaling Solar Zambia's record-breaking prices. The first part of this paper outlines other explicit and implicit subsidies that benefited the project. Competitive bidding, comprehensive project preparation, and other best practices undoubtedly impacted the outcomes, but without greater disclosure of deal terms, their impact can't be quantified and evaluated.

The Scaling Solar program is built on the insight that capital costs are the critical price differentiator for solar power projects. Utility-scale solar projects in Sub-Saharan Africa will continue to need significant DFI support because financially weak off-takers are the norm and can't be innovated away. The risk premium charged by the private sector to take on these risks represents genuine credit risk, not unfamiliarity with the deal structures that will disappear as more deals are completed. These projects are unviable at purely market interest rates. Solar capacity is not being built beyond token additions to capacity in low-income countries.

Cheap concessional financing and guarantees are critical for making utility-scale solar deals viable. It took $81 million of cheap DFI debt financing and a $5.7 million IDA payment guarantee to incentivize $24.5 million of equity from solar developers in Zambia. While Zambia's macroeconomic woes were particularly acute, debt levels across Sub-Saharan Africa have risen by nearly 20% of regional GDP since 2015, according to the IMF. The end of easy money from developed market central banks means that borrowing costs are even higher now. To begin to leverage more significant amounts of private capital through blended finance, DFIs need to transparently disclose explicit and implicit subsidies so that governments and solar developers can have clear price signals to weigh the tradeoff between higher capital costs and increased availability of funds.

Three actionable steps the IFC can take to reinvigorate momentum

The IFC's mission is to advance economic development by encouraging the growth of private enterprise in developing markets. It continues to innovate to fulfill its mission. The IFC 3.0 strategy focuses on creating the enabling conditions for market development.[43] It has adapted elements of Scaling Solar to scale mini-grids.[44]

The IFC can better fulfill its mission by taking the following steps:

1. **Acknowledge that expanding clean power access will continue to rely heavily on concessional DFI lending and guarantees to reduce the cost of capital**

   The IFC and other development finance lenders should openly acknowledge that the economics of building utility-scale solar capacity in low and lower-middle-income countries – where both project risk and interest rates are very high – will continue to need a heavily subsidized cost of capital. Scaling Solar was built around the premise that the cost of capital is the crucial lever for decreasing the price of solar power, but the lack of transparency hides this core feature.

   The IFC's 3.0 strategy outlines a decision-making sequence called *The Cascade* that "prioritizes private sector solutions wherever possible to optimize the use of public sector resources to focus them on challenges that the private sector cannot address."[45] Projects that are viable with single-digit interest rates are not viable with double-digit interest rates.[46] This is precisely where *The Cascade* suggests that the IFC and other development finance institutions should focus their lending: on projects with a high developmental impact that are not viable at market interest rates. The outcome of expanding low-cost, reliable electricity contributes to human well-being, progresses toward an SDG goal, and is an accelerator of private sector development.

   Discussions of blended finance should remain grounded in empirical reality. Every public dollar spent in Zambia catalyzed only 28 cents. Broader empirical evidence suggests that the expectations of mobilizing private capital in lower-income countries should be modest.[47]

2. **Transparently report explicit and implicit subsidies**

   IFC aims to promote positive development outcomes by encouraging the growth of private enterprise. Markets need accurate price signals to develop. This paper

[43] IFC, "IFC Annual Report 2020: IFC 3.0 - A Strategy for Creating Markets." It calls this focus on creating the enabling conditions for markets as working *Upstream*.
[44] IFC, "Scaling Mini-Grid (SMG)."
[45] IFC, "IFC Annual Report 2020: IFC 3.0 - A Strategy for Creating Markets."
[46] Kenny, "The Simple Math of Development Finance."
[47] Attridge, "Can Blended Finance Work for the Poorest Countries?"

makes the case that messaging that minimized the importance of explicit and implicit subsidies negatively impacted the development of the market for solar power in Sub-Saharan Africa.

Concessional financing, guarantees, and technical assistance are critical to the continued growth of the region's solar market. Going forward, IFC should determine the best way to openly communicate the value of its services to market participants so they have accurate price signals.

3. Innovate to improve power contract transparency

Contract transparency is essential to build a competitive utility-scale solar market and avoid hidden debts. The marketplace needs to know the actual prices and effective terms.

The IFC should innovate to maximize public transparency for PPAs, starting with its own projects and encouraging clients to make disclosure the norm. The Extractive Industries Transparency Initiative's (EITI) success in the oil and mining sectors provides a promising template. EITI created disclosure standards that provide vastly improved transparency while still being acceptable to investors in the extractives industry.

According to the Ministry of Finance's latest public debt summary, the Republic of Zambia currently owes more than $1.2 billion USD in government-guaranteed PPA payment arrears.[48] The World Bank Group has elevated debt transparency in developing economies as a priority issue, advocating that all contracts made with the sovereign should ideally be made publicly available.[49] PPAs contain significant contingent obligations on the public purse that are not currently public.

PPAs are kept private because they are considered commercially sensitive private contracts. But when these contracts come with public guarantees and affect a core public service, commercial secrecy should be kept to a bare minimum. Public transparency is essential, but so is operating in the public interest with public resources.

[48] Republic of Zambia, "End June 2022 - Public Debt Summary."

[49] Maslen and Aslan, "Enhancing Debt Transparency by Strengthening Public Debt Transaction Disclosure Practices"; Rivetti et al., "Debt Transparency in Developing Economies."

Conclusion

This paper seeks to re-examine the experience of the Scaling Solar Program in Zambia to uncover policy-relevant insights. It uses publicly disclosed information and must make reasonable assumptions where data remains non-public. It is far from comprehensive.

Compelling questions are left unanswered. *If Scaling Solar was so heavily subsidized, why didn't it gain more traction in other countries? What are the tradeoffs between pursuing utility-scale solar projects reliant on financially shaky state utilities and smaller-scale approaches like mini-grids? What are the real lessons of Scaling Solar?* This paper picked only the lowest-hanging fruit. The Climate Investment Funds (CIF) commissioned a comprehensive independent evaluation of its solar investment program.[50] IFC should consider doing the same for Scaling Solar.

Tackling vexing problems requires experimentation. Some strategies may succeed, and others may fail. However, most good ideas require reflection and course correction. Solar can't scale in the dark. Bringing the lessons of the past into the light of day maximizes our opportunities to innovate new solutions to expand affordable clean energy access to the hundreds of millions of people still lacking basic electricity access.

[50] Kyle et al., "Evaluation Report: Evaluation of the Scaling-up Renewable Energy Program (SREP) in Low-Income Countries."

Appendix 1: Additional Charts

Figure 4

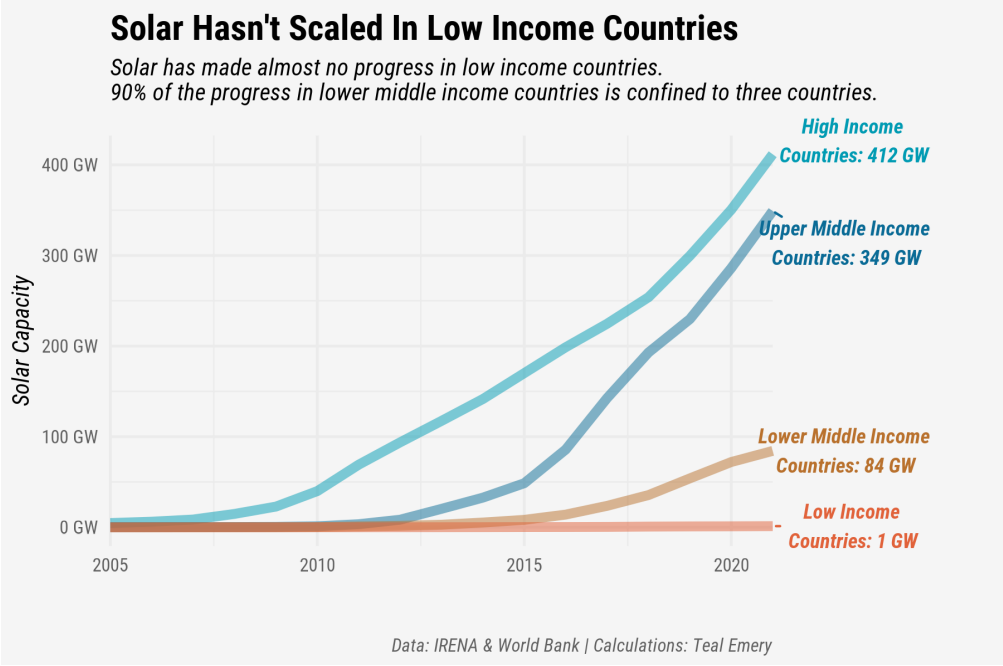
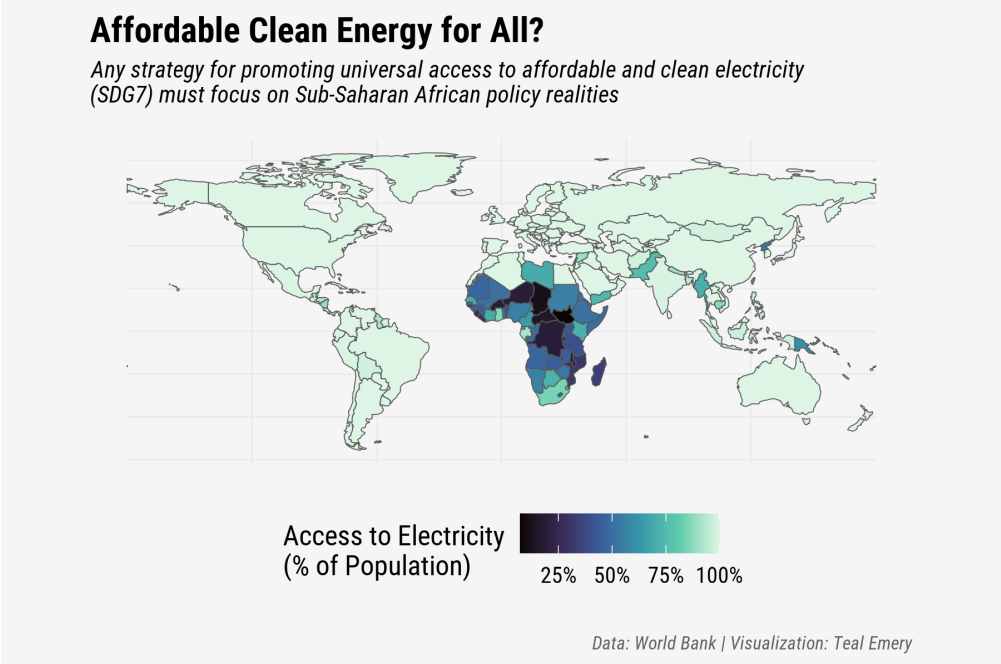


Figure 5



Appendix 2: Excerpt from the USAID project review

To avoid misrepresenting USAID's conclusions in their Scaling Solar project review, the relevant sections from the final report (pages 31-33) are presented here:

> ***The announced record low announced tariffs will not be easily replicable***
> *It was reported by several key informants that they understood or had heard that the winning bidders (and in particular Neoen) "had made a mistake" in calculating their winning low tariffs.*
>
> *However, it was stated by IFC in its report to USAID/Power Africa that "The extremely aggressive bid submitted by Neoen was based on a series of assumptions that Neoen set about validating after they had been awarded the project. These assumptions were made in such areas as available tax incentives and the lack of "thin-capitalization" restrictions (i.e., government restrictions on companies with substantial debt). IDC and the Zambian government had little choice but to engage, given that post-award disqualification of Neoen would have resulted in both a serious delay to the overall timeline and significant increased cost (the next-ranked bidder's bid tariff was around 35 percent higher than Neoen's)" (34).*
>
> *Hence, it is clear that the winning low tariff in the Neoen bid was not a mistake. Rather, Neoen's low bid was a deliberate (and successful) strategy to win the bid and then renegotiate terms afterwards with IDC and the Zambian government (34). The record low Neoen tariff could only be replicated with similar tax incentives that would be beyond the 5 years with no tax payable, full repatriation of profits, no tax on imported equipment (160, 161) offered to all bidders, and for companies with "thin-capitalization" or a low net worth to tangible assets that was expressly precluded in the RFQ available at the beginning of the bidding process (40).*
>
> *In a transparent bidding process, Neoen's bid should have been disallowed as soon as it became clear that the clear conditions in the RFQ had not been complied with, any applicable performance penalties applied (i.e. applicable bonds seized), and the next tenderer chosen, or the projects rebid. Ideally for a transparent process and for clarity over real tariffs that complied with the bid requirements, the first round Scaling Solar tender should have been rerun, as Enel also (as well as Neoen) apparently claimed extra tax benefits over those provide to all bidders (27).*
>
> *The first round of the Scaling Solar program has created an expectation of low tariffs that are highly likely to not be replicable in the 200/300MW of the second round of Scaling Solar that is still nominally underway in Zambia.*

The sole winning focus on lowest tariffs opens up post-award renegotiation risks

The way Scaling Solar was structured in the first round in Zambia: (1) bidders had an incentive to bid very low and bank on realizing a series of aggressive assumptions that they set about validating after they had been awarded the project (27-29, 31, 33-34); (2) IFC had an incentive to not push back against post-bid award' reopeners risk' by reopening bids and to minimize such issues, as IFC was paid for its transaction services when "financial close" occurred. So IFC stood to get no payment for its extra work if "financial close" was delayed or rebidding was decided on by IDC; and (3) IDC and IFC would have been embarrassed if they had had to announce that the record low tariffs announced with great fanfare were in fact artificially low and not real level- playing-field transparent tariffs.

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