



Scaling Infrastructure: New Tools for a New Strategy

In the last few years, IFC has prioritized an approach to creating bankable private sector infrastructure opportunities that we call “Scaling”—focusing not on single asset development, but on a holistic approach that creates a pipeline of infrastructure projects.

The essence of the Scaling approach is to develop a robust public-private partnership (PPP) model for a single deal and then replicate it. This spreads costs, enhances impact, and encourages programmatic, competitive tendering, with faster delivery and lower prices—genuinely creating new markets.

In some countries, this approach involved working with governments to design a process. In others, IFC has worked with investors and bankers, corralling views and facilitating dialogue. In each case, the ideas at the heart of Scaling—focusing on aggregation and investing upstream to achieve credibility downstream—were adapted to specific country

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circumstances. In all cases, the Scaling effort in process design and organization had a meaningful and long-lasting impact.

Here we bring together lessons from our experience with Scaling Infrastructure in five country examples—the “Seven Sisters” project in Jordan, the “Nubian Suns” project in Egypt, IFC’s Scaling Solar program, the Rewa project in India, and the RenovAr program in Argentina—together with five companion pieces that present each of these experiences in more detail.

Our conclusion is that the upstream effort pays off and it works, but in different ways and under different circumstances. We hope that the lessons highlighted here provide some signposts to the next set of pioneers looking to replicate the Scaling approach in their markets.



I Approaches to Scaling

Jordan Seven Sisters: Jordan's "Seven Sisters" are a group of seven solar photovoltaic (PV) projects aggregating 102 MW_{dc}/91MW_{ac} of new capacity. The seven plants featured in the first round of a renewable energy program launched by Jordan's government in 2011. The program included a total of 12 solar power plants, all of them relatively small, ranging in size from 10 to 50 MW_{ac}, for a total capacity of 200MW_{ac}. At the time, this was the largest solar PV initiative in the region.

The projects belong to five different sponsors. To overcome the scale issue, IFC and its partners came up with a novel solution, aggregating the first seven of these 12 projects into a single financing program, with a simplified and standardized financing structure. This innovative approach made the projects more attractive to investors and financiers and allowed the project developers to share costs and resources. All projects signed power-purchase agreements (PPAs) with Jordan's National Electric Power Company (NEPCO) in May 2014 and completed financing just five months later.

Egypt Nubian Suns. "Nubian Suns" is an IFC-led initiative that financed thirteen solar PV projects with a combined power generation capacity of over 750 MW under Egypt's Feed-in Tariff (FiT) program. Again, IFC and our partners adopted a programmatic approach to financing, consolidating multiple transactions into a streamlined process through standardization of financing and security documentation, and successfully meeting an aggressive timeline set by the Egyptian government. The approach mirrored that in Jordan; but with a government that had much more experience with IPP procurement—and was therefore much more confident that it could write its own rule-book. The leverage that was exercised through the Scaling approach enabled IFC to actively adjust this rule-book to ensure the projects were eventually bankable.

Rewa, India. Here IFC's Scaling efforts were led by its Transaction Advisory Services group, which had a formal mandate to advise the Indian state of Madhya Pradesh, on procuring solar PV power, again via a solar park, with multiple potential suppliers. The scale targeted for the solar park was large in itself—"Ultra Mega" at 750 MW—and posed a significant challenge in the bankability of the offtaker. The solution to this was to design the transaction in such a way as to open the market for cross-border transactions from one state to another under India's Open Access law, which had been enacted a decade earlier but never operationalized. Interest was attracted not only from Madhya Pradesh's utilities, but also from the Delhi Metro Rail Corporation. Careful design and risk mitigation attracted strong international interest for the first time at the state level, while simultaneously avoiding the need for reliance on subsidies. Furthermore, in the process IFC established a new auction system for renewables that has since been adopted more widely and produced the lowest prices the country had ever seen.

The Programmatic Approach: Efficiencies Through “Bulk Processing”

In Egypt and Jordan, IFC was able to achieve significant efficiencies through standardization and “bulk processing”:

One size fits all principle—standardized documents: IFC circulated a term sheet among developers outlining the common terms to be applied uniformly across all projects. The principle ruled out tailored solutions. No developer had reason to believe that it was not being offered the same terms as the others. On the financing documentation side, IFC produced a standard and balanced set of documents to minimize the need for extensive negotiations. Developers were given a single opportunity to submit comments.

Lowering adviser and service costs: The intermediary role that IFC played in PPA negotiation with the offtaker allowed for the consistent treatment of risks, such as those related to archeological and force majeure events. In addition, transaction costs were lowered for developers and lenders by mandating a common set of service providers, including lenders’ counsel, technical and insurance advisors and sponsors’ agents and account bank. IFC negotiated service fees and achieved bulk discounts. In Egypt, this standardization extended to the pooling of irradiation studies, which resulted in more solid and bankable data for all the developers.

Benchmarking EPC costs: Although Engineering, Procurement and Construction (EPC) and Operations and Maintenance (O&M) documentation were an exception to the standardization exercise, cost efficiencies were possible in these areas because of real-time benchmarking between different providers. In Jordan, the fact that most IFC projects were in the same site (Ma’an), enabled a common approach to land and permitting issues.

Syndicating on a programmatic basis: Since most developers had limited international project financing experience, as the common lead arranger, IFC sought out banks and advisory firms using its existing relationships. IFC required buy-in to the programmatic financing approach from the syndicated banks at the outset. IFC maintained a common set of documents for all projects in a data room. Each developer presented their project to a group of potential lenders with IFC having a say in the final allocation of lenders across projects. In Egypt, IFC built in redundancy—it had a surplus of syndicated financing, which enable last-minute gaps to be filled.

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IFC's investment team also financed each component of the solar park. The key element of IFC's interface was therefore in design of the procurement process, rather than the design of the interaction on the investment side.

RenovAr, Argentina: Argentina has a long history of independent power production, but also a checkered macroeconomic record that had delayed the procurement of renewable power. In 2016, IFC responded rapidly to a direct request from the Government of Argentina on how to establish a bankable renewables framework, quickly mobilizing “upstream” advice. The intervention became a World Bank Group-wide effort—and was completed in six weeks. Starting as an IFC light-touch effort that guided external counsel, the process evolved into an overhaul of the energy sector, ultimately creating close to 5,000 MW of renewables capacity. IFC's own investment has been so far limited to two projects—La Castellana and Achiras. Unlike other projects, this engagement was distinguished by the speed and quality of the response rather than its length and intensity.

Scaling Solar: In the previous four cases, IFC intervened with Governments that already had, to varying degrees, a track record with private investors. In Zambia, by contrast, IFC deployed the Scaling Solar program to establish the first ever IPP, investing upfront to leapfrog to a fully competitive and transparent bid for solar PV projects. This intervention included an extraordinary range of World Bank Group products, starting with a full transaction advisory engagement led by IFC's Transaction Advisory group, for the design and execution of a competitive procurement process. This was supplemented by a wide range of World Bank Group de-risking instruments—IFC finance, including Blended Finance, a World Bank Partial Risk Guarantee, and MIGA Political Risk Insurance. Each product was “stapled” to the bidding process, with fully articulated finance documentation issued as part of the bid documents. The first 47.5MW solar project was successfully closed at what was then a market-breaking tariff of US\$ 6 cents per kWh (which, with no indexation, translated into a levelized price of around US\$4–4.5 cents per kWh); a second of similar size closed in June 2018. In both cases IFC was a lender and arranger.

II Creating the Conditions for Scaling

The Holy Grail of most public procurement processes is a credible, transparent, competitive, fair and rapid procurement process. Evidence from around the world points to the fact that this maximizes investor confidence, lowers risk premia, and produces lower prices.

There are different ways to get there, however, and it's not always the case that immediately launching a competitive process by the book is the right thing to do, or that opening a market will always result in investors turning up. If a country has no track record, or experience with managing a process, investors and banks may hesitate, especially if risks such as bankrupt off-takers and sector imbalances have not been addressed. A particular, favored intermediate step is the use of a Feed-in-Tariff process.

Good timing is everything and in each of the interventions set out here, rather than deploy a cookie-cutter formula, IFC's teams configured their intervention to help the market along the path towards the Holy Grail.

In Jordan, for example, IFC's initial intervention was on a sole-sourced project, the Tafilah Wind Power Project. This established the templates for future project documentation. It also enabled IFC to move quickly to deploy the programmatic approach on Jordan's subsequent FiT-based process for the solar projects, firmly establishing the country's renewables market, and matching small-scale developers with international project finance for the first time. It is worth noting that the FiT approach was actually adopted in 2012 after an initial foray into competitive bidding had failed.

In Egypt, the Government initially adopted a FiT-based approach for renewables in 2014. IFC's programmatic approach with investors and lenders gave it the leverage to engage with the Egyptian government as it contemplated key terms necessary to make the PPAs bankable, including, in particular, conditions relating to arbitration. An additional challenge, interestingly, was a tariff that, at 14.3 US cents/kWh, was too high, and, to investors, looked unsustainable in the face of continued solar PV price declines. Against a fragile economic backdrop, Round 1 foundered. Round 2 in 2016 lowered the Feed-in Tariff, concentrated the project sites and took on board the substance of the recommendations on bankability, resulting in the successful closure of multiple sites.

India had long experience of competitive procurement of IPPs, including for renewable power. Even so, the Rewa project, at 750MW, was large for the State of Madhya Pradesh and the challenge was exacerbated by the wish to avoid subsidy support from the national government. Here, IFC's Transaction Advisory group engaged in transaction design that breathed life into the dormant Open Access legislation, bringing on board

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a strong out-of-state offtaker. Not only did this enable the transaction to achieve its targeted scale directly, but it also set a precedent for a market based on the trading of power across state lines.

In contrast to the sustained engagements involved in the other projects, IFC's intervention in Argentina was focused and rapid, but far-reaching in its impact on the market. The launch of a competitive bidding process for renewable projects under the RenovAr program marked Argentina's return after a 15-year absence both to the project finance market, and to IPPs. Getting it right was critical and the advice IFC and the World Bank provided focused on critical elements such as reducing subsidies; tailoring bidding criteria; including international arbitration; ensuring World Bank Performance Standards; and incorporating payment guarantees. The resulting framework proved effective in attracting international investors. The first auction was oversubscribed by a factor of six, enabling the award of 59 projects with a combined investment of US\$3 billion for 2.4 GW of renewable power in a country that, at that time, had barely commissioned 200MW.

At the other end of the scale, the ambition in Zambia was to transform the solar market for an entire continent. Throughout sub-Saharan Africa (excluding South Africa) prior to the intervention of the Scaling Solar team, solar deals were being negotiated one-by-one by developers and were almost universally stalling, with a constant tension between the (high) tariffs that were being sought and Government nervousness over agreeing to them against a backdrop of declining solar PV equipment costs. The huge upstream effort deployed by the team enabled Zambia to close its two Round 1 deals, despite the very weak creditworthiness of the offtaker and a wobbly economic environment. The ambition was to roll out this model to the entire continent, using the same process and template documentation. And, indeed, within three years, three more African countries had signed up to the process, with several others in active discussion. The impact on the market has been immense—Zambia's initial low prices have already been surpassed in Senegal, where a recent round of bids has produced an astonishing winning levelized price of US\$ 4.5 cents/kWh.

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Impact at scale

The most obvious impact of the Scaling approach is scale in output—volume of new capacity brought on line, volume of capital expenditure on infrastructure assets, and investment opportunities for financiers and sponsors:

- **Seven Sisters** The program led to investments in nine PV projects with a total capacity of 415 MW representing around US\$650 million in investment. Initially, the program involved a group of seven solar PV projects amounting 102 MW of new capacity (closed in 2015). Since the financial close of the original seven sisters, IFC has supported two more projects adding additional capacity of 313 MW. IFC arranged financing for all nine projects totaling US\$472 million (US\$176 million on its own account and the remaining US\$296 million from other sources).
- **Nubian Suns** IFC financed thirteen solar PV projects amounting to 752MW in power generation capacity and US\$823 million in private investment. IFC led a financing package of US\$653 million. Alongside IFC, the European Bank for Reconstruction and Development led the financing of another 16 Round 2 projects amounting to close to US\$500 million.
- **Rewa** The Rewa Solar Project has a total power generation capacity of 750 MW, split in three units of 250 MW each, and will generate US\$575 million in private sector investment in a low-income state in India. IFC provided a US\$437 million financing package. The success of Rewa encouraged other state governments to implement similar projects, starting with the state government of Odisha, which mandated IFC to develop solar parks of 1,000 MW. It has also led to discussions of a multi-State programmatic engagement with IFC.
- **RenovAr** The renewable energy procurement program that the World Bank Group helped design has resulted in the award of 147 projects amounting to close to 5 GW of power generation capacity—about 12 percent of Argentina's existing installed capacity—and US\$ 6 billion in investment commitments. IFC provided US\$64 million in financing packages for two wind farms under the programme.
- **Scaling Solar** The program has led to the award of four projects led by international companies with an aggregate generation capacity of 168 MW and involving investments of US\$157 million: two projects in Zambia and two projects in Senegal. The potential for additional business is significant: Within three years, IFC had ongoing mandates to develop more than 1,500 MW: a second round of projects in Zambia with prequalified bidders (500 MW); a project involving storage in Madagascar (25 MW) with prequalified bidders; and two rounds of projects in Ethiopia totaling 1,000 MW.

III Lessons Learned

Scaling can be adapted to widely varied country circumstances...

The five countries involved in these case studies were very different, with widely varied experience in renewables.

They ranged from an upper middle-income country such as Argentina, with a deep, though distant, history of engagement with IPPs, through to a low-income country like Zambia, with no history of IPP or renewable procurement. In several cases the

Table 1

CRITERION	SCALING SOLAR ZAMBIA	RENOVAR ARGENTINA	REWA INDIA	SEVEN SISTERS JORDAN	NUBIAN SUNS EGYPT
GDP per capita (2017)	US\$1,300	US\$13,040	US\$1,820	US\$3,980	US\$3,010
Experience with IPPs and Renewables	None with either IPPs or renewables	IPPS only 15 years prior	Extensive with both, at national level	Some prior with thermal IPPs	IPPs 20 years prior, none renewables
Macroeconomic Environment	Challenging	Challenging	Stable	Improving	Improving
Typical Deal Size	47.5 MW	99MW	250 MW	10–20 MW	50MW
Timeline	2 years+	9–12 months	1 year+	12–15 months	9–12 months
Creditworthiness of offtaker	Very low	Low	Low	Moderate	Moderate
Type of Bid	Bid	Auction	Reverse Auction	FiT	FiT

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macroeconomic environment was challenging, and in others the creditworthiness of the off-taker was a key issue. These differences were not clearly mapped to the bidding process adopted. However, the poorest two countries and the richest succeeded with ambitious bid/auction systems, while Jordan and Egypt implemented FiT programs.

Using different products and approaches, although upstream engagement was a feature of all

This variety of factors—and there are others—determines what is possible on the road to competitive renewable procurement, and the ability of IFC teams to adapt their approach was the key to their success.

Table 2

CRITERION	SCALING SOLAR ZAMBIA	RENOVAR ARGENTINA	REWA INDIA	SEVEN SISTERS JORDAN	NUBIAN SUNS EGYPT
IFC engagement	Transaction Advisory Mandate, Financings	Informal Transaction Advice, Financing	Transaction Advisory Mandate, Financing	Informal Transaction Advice, Multiple Financings	Multiple Financings
WBG involvement	WB, IFC, IFC Transaction Advisory, MIGA	WB, IFC, MIGA	WB, IFC, IFC Transaction Advisory, MIGA	IFC, IFC Transaction Advisory, MIGA	WB, IFC, MIGA
Resources/ Staffing	+++	+	++	++	++

In almost all cases, the ground for an ultimate investment was readied by some form of IFC advisory intervention. In Zambia and India, this was via a formal transaction advisory mandate. In Jordan, some of the key preparatory work was done around the Tafilah project, which was the precursor to the FiT program. In all cases, this extensive upstream work was critical to getting the details right—and, on the Rewa deal, designing a transaction that sold solar power across state boundaries for the first time ever under India's Open Access rules.

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In the Egypt and Jordan FiT engagements, although there was no formal appointment of IFC as an advisor, IFC still played a leading role in shaping the bankability of project and financing documentation, by virtue of the leading voice it had established for itself through the aggregation of developers and lenders.

In Argentina, a country with considerable experience and no shortage of capacity or advisers, RenovAr was a different approach again. Here IFC was able to have considerable influence through an informal—and extremely short-lived—advisory intervention, in large part because of the speed and quality of its response.

It is worth stressing that the approach in Zambia—and in the Scaling Solar program more generally—was unique, representing a carefully structured blend of both advisory and investment interventions. IFC's Transaction Advisory team was mandated to structure the competitive bidding process; but the bid was designed to include an offer of IFC finance, a MIGA guarantee, and a World Bank Partial Risk Guarantee. The upfront investment in resources was enormous (in part because it was also being used to develop a model and template documentation that could be rolled out rapidly to other countries in Africa). The investment in time paid off, enabling the Government to leapfrog the complications of dealing with unsolicited solar PV proposals, and achieve record-breaking prices for solar power in sub-Saharan Africa outside of South Africa.

The resource commitment under the Scaling approach is typically high, therefore, though there is some discretion. The light touch and heavy impact of the RenovAr intervention was probably unusual, and more difficult to replicate. The Zambian effort was unusual in its intensity, but it's worth noting that so were the results—a country with weak sector fundamentals and no track record of IPPs was able to leapfrog straight to a competitive bidding process and spectacular tariffs.

Engaging at scale increases leverage

An important point to note in the more programmatic engagements (Jordan, Egypt, Zambia) is that size matters. Had IFC tried to engage in dialogue with any of the three governments on the basis of being a potential financier in one of the relatively small projects that were being tendered, it would have been ignored. But because, in Egypt and Jordan, IFC represented a substantial group of projects and lenders, and in Zambia IFC was formally engaged to manage the process from A to Z, IFC was able to be influential enough to ensure bankability and success.

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The World Bank was almost always a direct part of the approach

In each case IFC engagement was coordinated closely with the intervention of the World Bank. Egypt featured a World Bank Development Policy Loan to create the enabling environment for private investment in the power sector; the Rewa project in India emanated from a World Bank program to strengthen the grid; the RenovAr program in Argentina involved close coordination with the World Bank and MIGA, which provided project guarantees and political risk insurance; and the Scaling Solar program in Zambia featured similar risk mitigation from the World Bank and MIGA.

In Argentina and Zambia, the frontiers of collaboration were extended. The special feature of Argentina was that the request came directly from Government. On both sides, the teams were able to respond immediately and effectively—a perfect model for relations with higher income countries. In Zambia, the coordination broke new ground. While IFC was advising the Government on procurement, World Bank, MIGA and IFC teams were seeking pre-approval of their respective risk mitigation and financing instruments so that these could be built into the bid process. Apart from the sheer logistical challenge of getting these processes to align, conflicts of interest had to be carefully navigated and new protocols established.

Table 3

CRITERION	SCALING SOLAR ZAMBIA	RENOVAR ARGENTINA	REWA INDIA	SEVEN SISTERS JORDAN	NUBIAN SUNS EGYPT
Technology	Solar	Wind	Solar	Solar	Solar
Date closed	2017	2016	2017	2014	2017
Typical Deal Size	47.5 MW	99 MW	250 MW	10–20 MW	50MW
Tariff (US \$ cents/kWh)	4.0–4.5*	5.4–6.1	5.0	16.9	8.4

* After adjustment for non-indexation

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Finally, a word on tariffs

The Scaling efforts under review took place against a backdrop of constant improvements in solar and wind technology and consequent decreases in unit prices. This trend continues today.

This evolution in technology (and, therefore, the date of the project) is not the only determinant of tariffs, however. Competitive bidding processes result in lower tariffs. Reinforcement of offtaker credit does the same. The credibility of the process being followed is key in bidders' minds. Macroeconomic stability plays a large part. Scale does too—bigger projects are cheaper per megawatt. Finally, tax incentives, VAT exemptions and land lease costs (or not) have a significant impact.

At first blush, the Jordan and Egypt FiT processes seem to confirm that FiT processes lead to higher tariffs. Remember though that the Round 1 FiT in Egypt foundered in part because the FiT tariff was too high. Remember too that Jordan failed with a competitive bid before switching to FiT—and that its program was articulated around relatively small projects. The macroeconomic framework is hugely important—look at how it affected the tariffs in Argentina, higher than in Zambia for bids in the same year. Similarly, the price in Zambia looks extraordinarily low given the sector framework. But these risks were hugely mitigated by an IFC-led procurement process, by a World Bank Partial Risk Guarantee, and by stapled IFC financing and by MIGA Political Risk Insurance. Indeed, investor reaction to the Scaling Solar process in Zambia—apart from to jostle for places on the short-list—was to complain that it was de-risked to such an extent that it set too low a benchmark for other African Governments. The fact is, though, that this benchmark has since been lowered in almost every other bid around the world.

The conclusion? Tariffs are clearly heading down, but benchmarks or targets are difficult to figure out on a blank sheet of paper. The best way to work out the market price for the package of risks that is being put on the table is to go to the market, with a competitive and credible process. In general, any surprise has been a pleasant one.