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Racing Towards 23% Renewable Energy

FIT to Start, but New Policies to Support Competition Are the Key to Indonesia's Renewables Future

Executive Summary

After experiencing more than 3 years without significant growth in renewable energy investments, there might be a glimpse of hope for Indonesia. The newly appointed Minister of Energy and Mineral Resources, Arifin Tasrif, announced back in late January, that the government will be replacing old fossil fuel power plants with renewables. The list includes 2,246 units of old diesel power plants (total capacity 1.78 GW), 23 coal-fired power plants (total capacity 5.7 GW), and 46 combined cycle power plants (total capacity 5.9 GW). The minister insisted that renewable power is non-negotiable, and has now became national priority.[1]

The government seemed serious with this statement. The Indonesian Ministry of Energy and Mineral Resources (MEMR) has been preparing for a new Presidential Regulation that would overrule previous ministerial regulations to accelerate renewable energy development to reach the 23% goal in 2025. On top of that, a renewable energy bill is currently underway and has been included in the House of Representatives' National Legislation Program (Prolegnas). This bill is set to provide an overarching umbrella to solve issues related to renewable energy regulations.[2]

Tempo magazine leaked some content of the presidential regulation draft in December 2019. It revealed a Feed-in Tariff (FIT) as the chosen mechanism to push renewable investment forward.

IEEFA acknowledges that although FIT might be used to kick-start some investments, carefully designed and comprehensive policies that support competition are more important. Based on lessons learned from other emerging countries, IEEFA's research shows that the best system-level outcomes are achieved when carefully designed auctions are used to meet well-understood system needs.

In this report, IEEFA notes at least 8 building blocks needed to build a strong renewables system design. They are:

1. **Finding the right price for FIT is always a challenge – market price is better than a policy price**. Studies show that even countries that have successfully implemented FIT programs for renewables, such as Germany

[1] Press Release by the Indonesian Ministry of Energy and Mineral Resources. 31 January 2020.
[2] Renewable energy bill set to remove uncertainty in green projects. Jakarta Post. 3 February 2020.

and Vietnam, they came at high cost. Both countries now prefer auctions to arrive at better pricing.

2. **Auctions are now the preferred way to provide scalable and cost-effective renewable energy**. Implementing FIT for small scale renewables won't make much difference in increasing renewables investments in such a short time. Especially if the Indonesian Energy Supply Business Plan (RUPTL) is still fixated on big slabs of hydro, pumped storage and geothermal energy, and disregard the transformational effect that deflationary solar and wind technology can bring to the system.

3. **A transparent and well-designed auction de-risk capacity addition through price discovery.** Emerging markets around the globe have successfully run auctions that resulted in fast increase of capacity addition while simultaneously discovering lowest tariff. They managed to achieve this by de-risking their procurement process through assured transparency, well-understood bidding process, and well-prepared bidding documents.

4. **The devil is in the details – auction design must address local conditions.** Different countries apply different ways to de-risk their auctions depending on each country's ability to absorb risks. Whichever way is chosen, the market will decide via the offering price.

5. **Make or break design decisions for Indonesia – getting the off-take commitment and permitting process right**. Curtailment risk and PLN's commitment for off-take is key to getting more renewables penetration. The importance of investment in the grid to increase system's strength and flexibility should never be underestimated.

6. **Auction or FIT? Indonesia's bankers don't care.** What they care about is the project's technical feasibility, credit-worthiness of the sponsor, curtailment risk, and other major commercial risks that cannot be absorbed by developers.

7. **The overall cost of capital is a major determinant in clean energy pricing in emerging economies**. Rather than focusing on providing subsidies to cover the surcharges coming from the FIT program, the government might be better off if it can find a way to reduce the cost of capital, i.e. lower bank interest rates for renewables projects.

8. **Support small and medium developers with tailored programs, not special terms.** Small and medium players would benefit more from tailored programs that would help them reduce their development cost. Support on the upstream side (development phase) rather than on the downstream side (tariff subsidy) would be preferred by the Ministry of Finance.

If Indonesia is serious about its push for renewables, the government needs to focus on cost competitiveness for the long term instead of only for quick wins. The move toward FIT is much appreciated, but a quick transition to transparent competitive reverse auctions would be the best approach moving forward. The MEMR, along

with PLN and the Ministry of State-Owned Enterprise (MSOEs) and other related government entities would need to focus more on the important work of designing comprehensive policies—to create a stronger grid system and new industrial-scale renewables capacity.

It is important to note, that if the FIT mechanism is chosen for now, it should be technology specific, volume capped with limited implementation period, staged-down or step-down, and with stringent pre-qualification for developers. It is also important to have a clear statement in the regulation to declare the exact expiration date of the FIT and the transition phase toward transparent and competitive reverse auctions—to prepare investors and industry players to be ready to compete.

Regardless of the purchase mechanism—FIT or auction—the government needs to make sure that PLN's power purchase agreement is bankable. This can be done by ensuring that risk allocation is fair, tariff is (preferably) in USD and indexed to inflation, and the PPA is standardized. To limit the risk of curtailment, priority dispatch for renewables can also be applied to PLN, with some corridors that have been pre-set in advance.

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Background

Current Situation—Overloaded with Fossil Fuel, Ignoring Renewables

Indonesia is considered a laggard in renewable energy development compared to its ASEAN neighbours. Over the last 10 years, countries such as Vietnam, the Philippines, Thailand, and Malaysia have managed to more than double their installed renewable capacity. Indonesia, meanwhile, has focused on baseload coal independent power producers (IPP) while ignoring the transformational effect solar and wind technologies is having on power markets globally.

Most ASEAN countries are working hard to move up the renewables learning curve. There is clear evidence of accelerating market development as policymakers move from targeted incentive programs that build market capacity to market-based approaches that will bring renewables into line with conventional power. This new focus on auctions and coordinated grid development means that developers can now find attractive projects where renewables can reach grid parity and provide cost-effective clean energy solutions.

Indonesia, on the other hand, has struggled with outdated power infrastructure and operating habits, resulting in a lack of business initiative and the political support needed to boost investment in renewables.

The Case of Failed Renewable Energy Projects

The Indonesian government's poor policy track record on renewables started in 2017 with the release of MEMR Regulation no 50/2017 establishing a new renewable tariffs' regime. It was coupled with MEMR Regulation no 10/2017 (which was then replaced by MEMR Regulation no 49/2017) that governed risk sharing between PLN and IPPs. Rather than creating a pathway to the market for viable ventures, the regulations effectively stalled the development of a healthy pipeline of renewable energy projects in Indonesia with its protracted negotiations over terms and conditions.

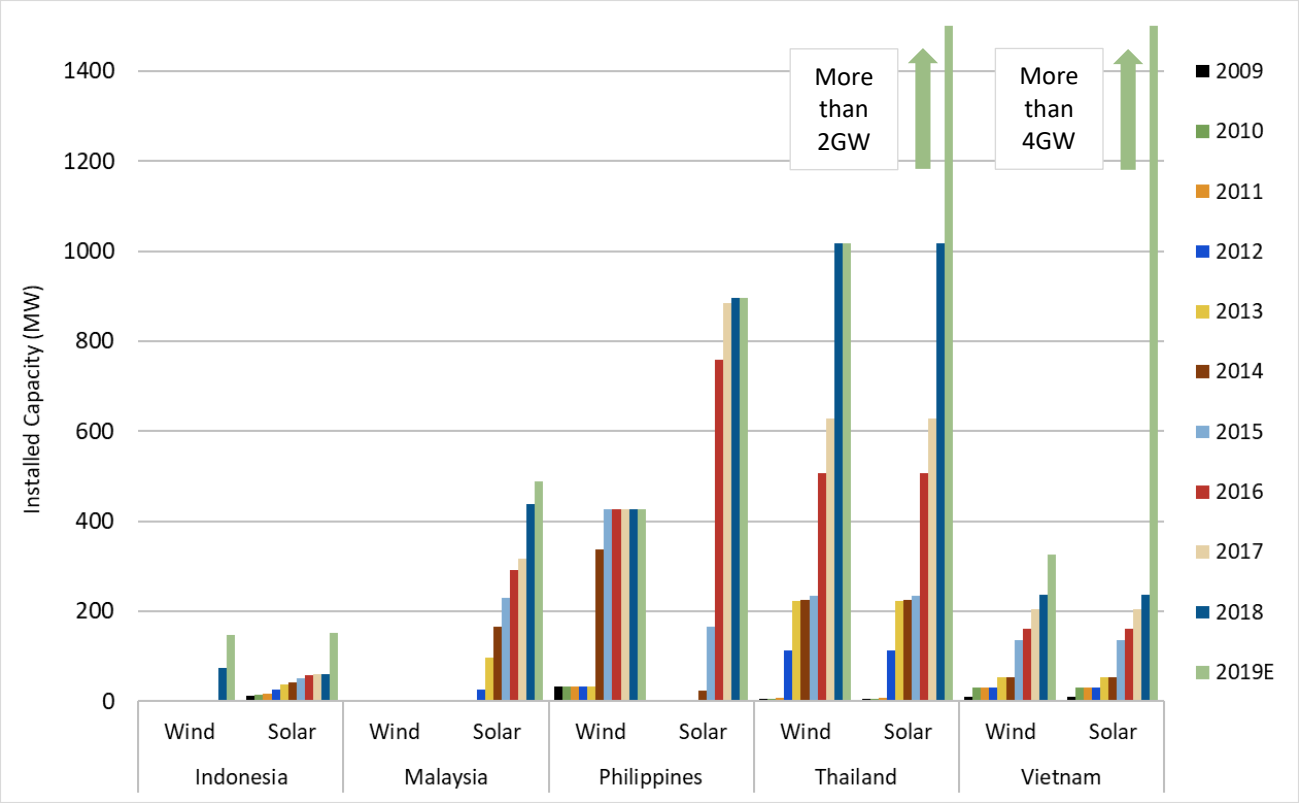
The State Utility monopoly—Perusahaan Listrik Negara (PLN) might beg to differ, claiming to have successfully signed 75 renewable Power Purchase Agreements (PPAs) during 2017-2018. However, these agreements covered old projects that had already been in PLN's pipelines for years.

As of today, as many as 27 of 75 projects have not reached financial close, and 5 PPAs were terminated at the end of 2019[1]. This shows just how critically the market viewed the regulations and highlights how the process has failed to streamline approvals. Some of the delay is caused by financing barriers, which occurred for several reasons - usually related to risks created by specific terms and conditions in the PPA that developers could not overcome in negotiations with bankers and investors.

One apparent gap relates to the quality of the initial project pipeline. It appears that in some instances, PPAs are said to have been opportunistically signed in a hurry before the completion of proper feasibility studies—a strategy that had to be unwound when project fundamentals were analyzed, putting the financial viability of the projects in question.

For some IPPs, there were also problems with the Build Own Operate Transfer (BOOT) provisions, as well as risk-sharing provisions that favored PLN over developers. These structural problems in the PPA aggravated the funding challenge, especially for first-time developers in Indonesia, many of whom were small and medium players that lacked established banking relationships and found it hard to provide the kind of recourse required by the banks.

Figure 1: Installed Renewable Energy Capacity in ASEAN (in MW)



Source: IRENA (2019), Renewable Energy Statistics 2019, The International Renewable Energy Agency, Abu Dhabi. 2019 figures are derived from multiple sources, taking official numbers as much as possible.

There has arguably been no new investment in Indonesia's renewable energy industry since the the Indonesian Ministry of Energy and Mineral Resources (MEMR) introduced several new energy policies in 2017.

The question now is how President Joko Widodo's (Jokowi) second administration can position itself to leapfrog over traditional energy and into renewables. This will require a mix of policy initiatives—some focused on transitional measures to support smaller projects, with a more significant focus on the policy formula needed for cost-competitive industrial-scale projects. The first initiative to emerge is a feed-in tariff (FIT) proposal that could breathe life into a range of sub-20MW projects that have been stalled since 2017.

FIT to Start—A Transitional Program of Incentives for Small Projects

The government, encouraged by energy minister Arifin Tasrif, is hoping to move quickly on opening the door to a more effective renewables policy. With an eye on so-called "quick wins," the MEMR is believed to be drafting a high-level Presidential Regulation to help speed up investment in small-scale renewables. Tempo magazine, a prominent domestic weekly, covered the story recently, coming up with

a table that explains a new feed-in tariff (FIT) for different technologies of renewables.[3]

Table 1: Proposed New Renewable Energy Tariff Scheme—as Seen From Project Developers' Point of View

Generation by Type	Size		Purchase Mechanism		Tariffs by Type			Tariff Terms	
		Assignment	Direct Appointment	Direct Selection	FIT	Negotiated (PLN)	Lowest Price (No Negotiation)	Location Dependent	Staged
Geothermal	All	v			v			v	v
Hydro	< 20 MW		v		v			v	v
Hydro	> 20 MW		v			v		v	v
Hydro	Irrigation	v				v		v	v
Solar	< 10 MW		v		v			v	v
Solar	> 10 MW			v			v	v	v
Wind	< 10 MW		v		v			v	v
Wind	> 10 MW			v			v	v	v
Bio mass/gas/fuel			v		v			v	v
Waste to energy		v			v			v	v
PPP (State & Provincial)		v			v			v	v

Source: Based on Skema Baru Energi Terbarukan, Tempo magazine, 21 December 2019
The color differentiation represents views from renewable energy developers. Darker green means a more negative view.

According to Tempo, the new scheme will be governed by a Presidential Regulation that is set to be issued early this year. The feed-in tariff (FIT) instrument was chosen by the government to spare independent power providers from having to undertake what is typically a prolonged and complicated negotiation with PLN.

There will be no price escalation for the duration of the power purchase agreement, starting from its commercial operation date (COD). Instead, the FIT will be staged – meaning the price will decline after an agreed time – usually when the loan period is over.

The new scheme will be welcomed by the many early renewables developers who have seen their hopes for small projects frustrated by a cumbersome and opaque direct negotiation process with PLN.[4] Though the details of the FIT have not been formally announced, industry players anticipate that the details of the new FIT

[3] The table is not formally confirmed by the MEMR, but it does reflect the discussion among stakeholders about this upcoming Presidential Regulation.
[4] Hamdi, Elrika. The Case for Power System Transformation in Indonesia: Time for a Full Electricity System Audit. IEEFA, November 2019.

scheme will be an improvement on both the terms and the process stipulated by MEMR Regulation no 50/2017.

The scope of the FIT under discussion appears to offer highly targeted incentives that will make this a limited program, however. By design, the best treatment targets small-scale solar and wind projects of less than 10MW, but only in locations that meet PLN's approval. In addition, although the FIT will be more generous than the previous BPP[5] rules, it will be staged-down. Depending on the final terms, it is also possible that the new Regulation will deliver most of its benefits to conventional geothermal and small hydro projects that have long been a staple of PLN's renewables program.

This FIT program may stimulate some investment, but it also offers a reminder to policymakers about the limitations of FIT programs and the importance of transitioning quickly to policies better suited to the development of a robust competitive market for renewables. It is time for MEMR, the Ministry of State-Owned Enterprise (MSOE) and PLN to turn to the more important work of designing comprehensive policies– to coordinate the development of the grid and new industrial-scale renewables capacity – to get the most out of new deflationary solar and wind technologies.

Building Blocks for Renewables System Design—Lessons from the Market

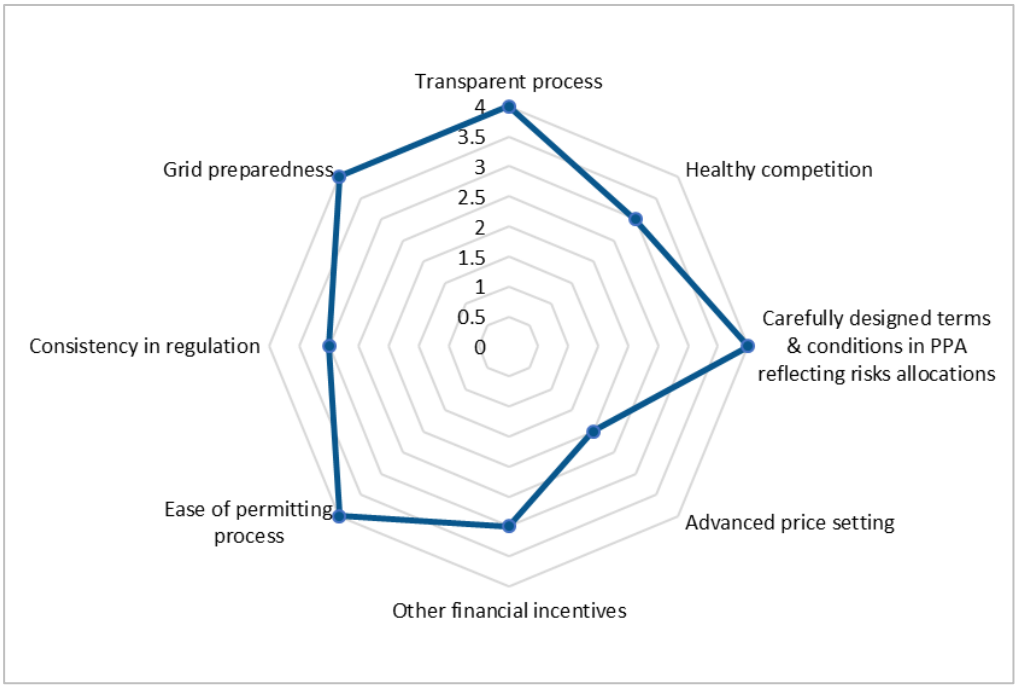
Being a laggard has its perks. Indonesia can learn from other countries' experience, avoiding the trial and error that other nations have had to face in their transition from fossil fuels.

The government's effort to take up all concerns raised by developers and industry associations is valued, but IEEFA suggests that policy makers should think critically over how to create the best enabling conditions by studying the examples and explanations provided below.

The spiderweb chart presents important elements needed for a better power system design that would accelerate renewable energy development in Indonesia. Based on IEEFA's own analysis and scoring, the advance price setting or FIT is not seen as the most important element in power system design.

[5] The MEMR Regulation no 50/2017 stipulated that tariff for renewables are capped at 85% of PLN's power generation cost (BPP).

Figure 2: Crucial Elements for Power System Design



Source: The chart is derived from IEEFA's own scoring for power system design elements. Analysis is based on the research conducted for this paper.

Solving for the "Right Price"—Why a Market Price Is Better Than a Policy Price

Since the first draft of the Presidential Regulations was floated publicly by MEMR, it's notable that much of the debate has focused on the question of how to engineer the "right price". Having effectively play the role of price-setter, MEMR will now naturally be forced to look for ways to verify it has determined exactly the right structure and FIT price. Students of renewables policy development will know that the MEMR's effort to promote consensus on how the FIT is calculated may succeed, but only temporarily. History shows that few of these administered measures have served the market well over time. Instead, MEMR price setting may raise the political risk for all involved in the process.

MEMR price setting may raise the political risk for all involved.

The fact is that FIT policies often prove vulnerable to changes in market reality. For example, there is always risk that the right incentives for developers might be judged to be too high relative to PLN's average generation cost or prices achieved in

other comparable markets. At the same time, the government's readiness to act will depend on whether it could absorb the extra surcharge through subsidy, which will require Ministry of Finance and Parliament's approval. Even then, it still might not be enough for certain kinds of developers.

Meanwhile, the right price for PLN is most probably not economically feasible for developers, especially if PLN seeks to match renewables prices with baseload fossil fuels. Whatever method of calculation is used, or assumptions made to arrive at the final FIT policy, it is unlikely to satisfy all stakeholders.

A review of Germany's and Vietnam's experience with FITs makes it clear that policymakers and market players should keep the following points in mind:

Germany—Early Innovator, Frequent Changes, Stable but High Cost

Germany launched the first green FIT with the Electricity Feed-in Act 1991.[6] The goal was to open up German's renewable power market to new technologies and to spur innovation. The 1991 Act was then refined with a more sophisticated regulation in 2000, famously called as the Renewable Energy Sources Act (EEG).

Up to today, the EEG has been updated every few years to adapt to new developments in the renewable energy sector. These schemes have managed to secure more than 120 GW of renewable energy investments over the course of 30 years, mostly wind and solar[7]. Each EEG comes with its own specific tailored criteria and principles covering issues such as guaranteed connection and priority dispatch. Specific provisions have adjusted the length of the guaranteed FIT depending on location, size, energy yield, maturity of the technology, and yearly tariff regression.

Although the FIT has successfully mobilized capital and sophisticated technology, these programs have come at a high cost for German consumers – in particular households and small business consumers. German households pay one of the highest electricity prices in the world, currently averaging at around EUR 0.3088/kWh[8] (roughly US$ 0.35/kWh) as compared to IDR 1,467/kWh[9] (approx. US$ 0.11/kWh) in Indonesia. Substantial subsidies to heavy users such as the automotive industry were offered by German government to maintain the industry's cost competitiveness.

Vietnam—Fast Scale-up, Changes to Terms, and Transition to Auctions

A more recent example of a country that has successfully implemented a FIT program to boost renewable energy investment is Vietnam. Over the course of two years—2017 through 2019—Vietnam was able to attract 4.5 GW of solar installed capacity and an expected 1.5-2 GW of wind contracts over the next two years.

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[6] A table comparing different kinds of renewable energy instruments applied by different countries is presented in Annex 1.
[7] Energy-charts.de
[8] Electricity Price Statistics. Eurostat, 2019.
[9] PLN Tariff Statistics 2020.

Given shortfalls in power supply—and the long development timeline for fossil fuel plants—Vietnamese authorities prioritized the rapid mobilization of new capacity. A clear schedule for the commercial operating date (COD) was set for the solar and wind projects. If the developer missed the COD—June 2019 for solar and November 2021 for wind—it would not be entitled to the agreed US$0.09/kWh FIT and would have to negotiate the purchase price with EVN.

The Vietnamese government has also taken a pragmatic approach to developers' concerns. When the solar FIT was first introduced, international funders and developers were cautious, citing concerns that the PPA would be unbankable due to concerns about EVN's credit quality, curtailment risk, and the termination clause[10]. These concerns were ultimately addressed with a revised PPA, Circular 2, with changes to the *force majeure*, curtailment, and termination clauses as well as a differentiated and higher tariff for the offshore wind FIT.

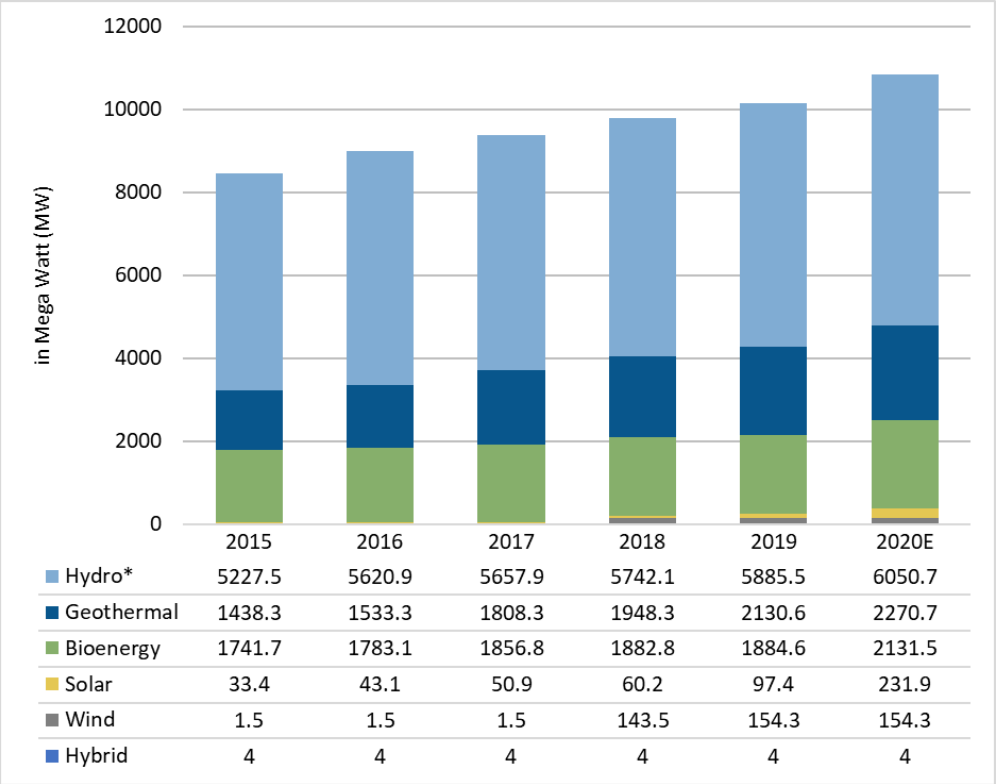
As the solar FIT program approached its final term in 2019, Vietnamese authorities were quick to take the initiative and address next steps for the country's renewables development program. Given the unexpectedly strong response to the FIT program, grid investments to avoid curtailment risks will be a near-term priority for EVN. Now that the market has attracted a quality group of developers with proven ability to scale, it's time to head for the cost-effective outcomes that auctions can deliver. Prime Minister Nguyen Xuan Phuc has now demanded auctions to be the engine for the market's next phase of growth.[11] In fact, the World Bank is currently helping the nation to prepare its first 1GW of solar auction later this year.[12]

Auctions Are Now the Preferred Way to Provide Scalable and Cost-Effective Renewable Energy

Since the beginning of Widodo's second term, a motivated new team of Indonesian policymakers has targeted policy moves that will be a catalyst for innovation. This will be particularly important for the power sector as the challenge of adding 13.7 GW of renewable energy must be prioritized soon if the country wants to comply with its Paris commitment to achieve a 23% clean energy mix in 2025.[13]

[10] Vriens, Michiel and Melissa Brown. Vietnam's Solar FiT Program Delivers: Watch for Progress on the Grid and Wind. IEEFA, September 2019.
[11] Kenning, Tom. Vietnamese PM demands solar auctions in place of subsidies. PV-Tech. 26 November 2019.
[12] Martin, Jose Rojo. World Bank: Vietnam's auction shift to unlock orderly solar boom. PV-Tech. 2020.
[13] Currently Indonesia's renewable generations account for only 12.36% of the energy mix.

Figure 3: Indonesia's Renewable Energy Installed Capacity



	2015	2016	2017	2018	2019	2020E
Hydro*	5227.5	5620.9	5657.9	5742.1	5885.5	6050.7
Geothermal	1438.3	1533.3	1808.3	1948.3	2130.6	2270.7
Bioenergy	1741.7	1783.1	1856.8	1882.8	1884.6	2131.5
Solar	33.4	43.1	50.9	60.2	97.4	231.9
Wind	1.5	1.5	1.5	143.5	154.3	154.3
Hybrid	4	4	4	4	4	4

Source: MEMR Presentation. 2019 Performance Achievements and 2020 Program. *9 January 2020.*

The FIT currently in development will play a role, but it is not the right tool for mobilizing the type of high-quality industrial scale renewables capacity needed to meet the 2025 target. This is clear from the fact that **the FIT will only be applied to small scale renewable projects.** Large ones—those above 10 MW of wind, 20 MW of hydro, and 10 MW of solar[14]—are either procured through negotiation with PLN or by direct selection where least-cost applies without negotiation—a policy approach that will not foster a transparent market that encourages long-term performance.

The FIT will only be applied to small scale renewable projects.

[14] This is assuming the Tempo table correctly presents the regulation draft.

Table 2: Additional Need for Capacity from Renewable Sources to Reach 23% in 2025

Fuel Source	2025 Target	Number of Projects If This Comes From 10 MW of Solar and Wind	Number of Projects If This Comes From 20 MW of Mini Hydro	Remaining Capacity That Needs to Be Negotiated With PLN
Small Hydro	1,344		67	
Big Hydro	3,811			3,811
Pump Storage	1,983			1,983
Geothermal	4,172			4,172
Other Renewables (Inc. wind, solar, bioenergy)	2,424	242		
	13,734			**9,966**

Source: RUPTL 2019-2028.

The planning and execution of PLN's electricity supply has long been questioned because Indonesia's Electricity Supply Business Plan (RUPTL) sets aggressive targets but the details are vague and goals not met. The table above indicates that RUPTL still assumes that the easiest way to meet the 2025 target is to develop geothermal and large hydro, leaving increasingly competitive solar and wind technology to pick up the scraps. The assumption seems to ignore trends in most power markets globally.

One way to break this pattern of underperformance is to look at other markets strategies that have attracted the capital and clean energy technology needed to meet ambitious energy goals. If normal patterns were to prevail, IPPs would likely need to undergo a lengthy negotiation with PLN to realize the required 9.9GW (column 5)—the exact process that has been avoided by the IPPs. This pattern of opaque bilateral negotiations has resulted in a legacy of projects governed by inflexible capacity payments—mostly fossil fuels—that impose high costs on Indonesia's power system.

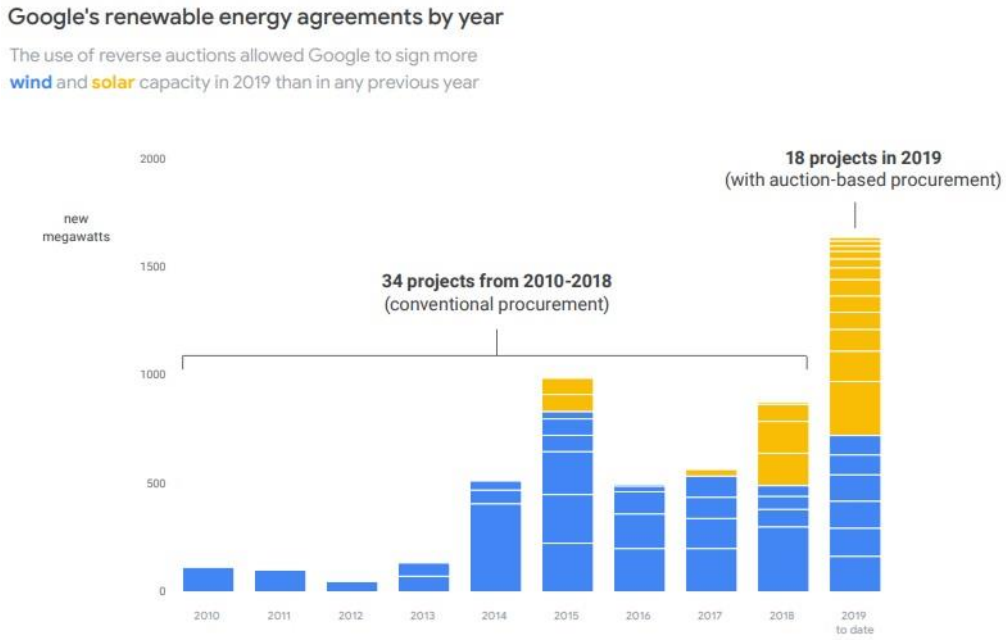
In contrast, research shows that auctions are now the preferred procurement mechanism for almost half of the emerging markets surveyed. Bloomberg New Energy Finance reports show since 2009, there have been 133GW of clean energy contracts awarded by 104 emerging markets through competitive auctions.[15]

The case for auctions versus one-off project negotiations has been vividly demonstrated by corporate power buyers such as Google. As one of the world's biggest corporations committed to clean energy, Google had up to 2018 procured its energy via the conventional issuance of a one-off request for proposals (RFP) specific to individual regions where it operated. Google was quite successful,

[15] Bloomberg New Energy Finance. Emerging Markets Outlook 2019. November 25, 2019.

contracting 34 projects between 2010-2018. But when Google ran its first online reverse auction in 2019, it was overwhelmed by the results. Google managed to procure 18 projects with a total of more than 1500 MW of wind and solar capacity. The reverse auction also resulted in an impressive 17— 23% price decline versus the opening price. The key to this is a very clear procurement process and well-designed conditions set in advance.

Figure 4: Google Renewable Energy Purchase Agreements by Year



Source: Case study: Accelerating Renewable Energy Purchasing through Auctions. Google. October 2019.

In addition to the benefit of competition, auctions can also be structured to be technology agnostic. The auction process can encourage price discovery for different clean energy technologies with operating characteristics that best suit grid management. This factor is crucial in a power market such as Indonesia where looming over-capacity in the Java-Bali grid now means that efforts to meet the 23% target will have to focus on Kalimantan, Sumatra, and Sulawesi—regions with under-developed grids that require flexibility.

The auction process can encourage price discovery.

Rather than automatically allocating capacity to baseload options like geothermal or large hydro first, it would make more sense to prioritize grid planning and storage options before testing the ability of developers to meet requirements with a mix of

industrial-scale wind, solar, geothermal, and hydro capacity. Recent history across a number of markets shows that well-designed auctions for utility-scale solar and wind on designated sites can attract low-cost concessionary financing and encourage prominent renewable energy players to lower the purchase price. This capacity can provide power to the grid sooner than geothermal or hydro because it takes less time to build.

A Transparent and Well-Designed Auction De-Risks Capacity Decisions Through Price Discovery

One of the most powerful attributes of a well-designed competitive auction is that it de-risks the price-setting process for new capacity. Transparent price-setting is done best via an online auction with transparent terms and conditions, a pre-qualification process, and well understood bidding processes. This eliminates risk for policymakers, and instead lets the market compete to discover the new lowest price.

The key to competitive auctions is to be able to attract experienced developers with established track records and local champions that can take risk in order to build a strong market position over the long term. Such bidders are often able to submit highly competitive prices by leveraging better financing terms, having good relationships with top equipment suppliers, and more accurate assumptions on operating expenses.

In contrast to the process that often surrounds FIT regimes, an auction policy process usually engages market players by providing supportive terms and conditions but leaves the price-setting to the market to avoid bias. This is a constructive process for policymakers as it helps them build capacity by learning to identify how different types of developers would value factors controlled by the national authorities. Setting up the first set of terms and conditions for the first auction can be costly and complicated to master, but it is a long-term investment that can be offset by cost-savings from successful auctions.

South Africa and Mexico are probably two countries with similar characteristics to Indonesia that quickly progressed to auctions to accelerate their renewable energy development. Like Google, both countries ran well-received auctions that drew a pool of experienced bidders and produced cost-competitive outcomes.

South Africa – Auctions Contract 6.3 GW Through a Commitment to Transparency

South Africa's experience is particularly interesting because of the many similarities to the Indonesian context. Eskom, South Africa's vertically integrated utility, has had a poor track record of negotiating credible contracts with third parties. The government tried to implement a FIT over 2009-2011. The program failed, with no new renewable power agreed by Eskom over that period. The failure was due to uncertainties in the proposed legal framework that led to mistrust among investors.

The Department of Energy then abandoned the FIT and switched to auctions, launching the Renewable Energy Independent Power Producer Procurement (REIPPP) in 2011. The well-designed and transparent auctions held within this program provided striking results. The first round of auctions brought in 1,415 MW of renewable capacity, and the second yielded up 1,044 MW. The improved bidding process has been repeated four times over the last few years, and in total has brought in 6,328 MW of renewable generation.

The REIPPP process was designed to cover diverse technologies including wind, solar, small hydro, biomass, biogas and landfill gas projects. They followed a two-stage assessment process, where first stage served as a pre-qualification round for bidders meeting minimum legal, financial, technical and environment requirements. The second stage weighted the selection criteria at 70% of the bid price, while the remaining 30% was from consideration of job creation, local content, preferential procurement, enterprise development and socio-economic development.[16]

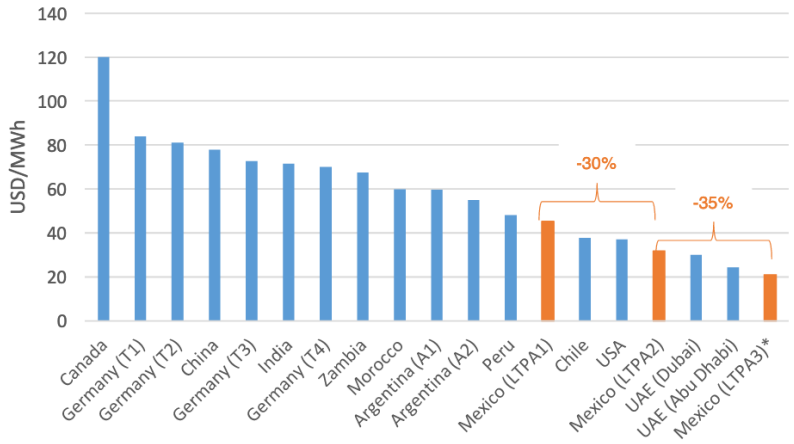
In 2015, as a result of fierce competition, the South African government received very cost-competitive bids by global standards—US$ 0.064/kWh for solar and US$ 0.047/kWh for wind.[17] This is the result of pragmatic decisions taken by the government to run the program, rather than Eskom. In addition, the auction design and management benefited from the participation of global experts and a commitment to transparency such as 24-hour voice and CCTV monitoring of the auction process. This is similar to the process used in India where winners are announced online along with a full explanation of the PPA terms and conditions.

Mexico – Record Low Prices and Lessons for the Government

After an electricity reform law was enacted in 2015, Mexico developed a long-term power auctions (LTPA) program. Since then, Mexico has managed to launch three competitive auctions, awarding 36 solar projects and setting a new benchmark low price for solar power at US$ 0.0355/kWh for solar and US$ 0.0429/kWh for wind in 2016. The last auction round in 2017 even produced a rock-bottom price at US$ 0.021/kWh[18] thanks in part to Mexico's very strong solar resources and the rapid decline in solar PV module prices.

[16] Eberhard, Anton. Feed-in Tariff or Auctions?: Procuring Renewable Energy Supply in South Africa. The World Bank and IFC. April 2013.
[17] Eberhard, Anton and Raine Naude. The South African Renewable Energy Independent Power Producer Procurement Programme: A Review and Lessons Learned. Journal of Energy in Southern Africa, vol. 27. N.4. Cape Town. November 2016.
[18] Davis, Lucas. Mexico Goes Backward on Renewables. Energy Institute at Haas. August 12, 2019.

Figure 5: Mexican Solar PV Prices Among the Rest of the World in 2017



Source: IRENA, 2017. CENACE, 2017 for LTPA3.
Note: "Calculated average prices resulting from renewable energy auctions presented in this report may differ from the data published by other sources due to the different aggregation and/or price correction methodologies used." IRENA, 2017. A = Auction, T = Tender.
** Not included in IRENA, 2017.*

Unfortunately, despite the Mexican auctions' success in price-setting, the pre-qualification process overlooked issues that have undercut the viability of most of the projects. In a cautionary lesson for auction designers, winning bidders found themselves unable to obtain necessary construction permits from municipalities seeking inflated fees for permits.[19] Nevertheless, despite political cross-currents, the business community continues to support the auction process.

The Devil Is in the Details—Auction Design Must Address Local Conditions

South Africa's renewables auction track record is a notable bright spot for a power sector that has struggled to manage its transition to clean energy. It highlights the way that auction design can establish a realistic set of trade-offs, permitting both the sponsoring authorities and developers to hedge risks that the other party would struggle to manage at reasonable cost.

The South African process is a worthy case study. Not only was South Africa pragmatic about addressing marketplace realities, resulting in world-record low prices, but it has also had a clean record of successes. Of the 92 projects awarded throughout the four auction cycles, none have failed. Valuable lessons can be learned from this, notably the terms imposed on bidders in the tender documents and legal contracts, as well as the design and management of the procurement process.

[19] Guadarrama Gandara, Carlos Andres. Renewable Energy Auctions in Mexico: the Gap Between Design and Implementation. Harvard Kennedy School. March 2018.

For example, in many other auctions, the government would have chosen the sites, borne the cost of connection and generally assumed more of the risk. The South African government could not accept this obligation and shifted the responsibility of land provision to the bidders and put the risk on the developers instead.

To offset this "cost," South Africa took significant steps to de-risk its dispatch and payment terms. It supported developers by standardizing the PPA and offered a government guarantee for Eskom's payments and indexed tariffs to inflation. It also offered step-in rights for lenders in the event of default and set realistic terms for connection. This was done by offering connection agreements in advance that made the IPPs responsible for the cost of shallow connections to the nearest substation, but not for the deep connection costs of transmission.

To reduce the risk of awarding contracts to inexperienced bidders—who would subsequently struggle to find finance and deliver their projects as required—they imposed a high penalty cost and an unconditional, irrevocable Bid Guarantee per MW of contracted capacity for the proposed project. The bid guarantee is actually similar to the way PLN procured some of its power projects.

There are other valuable examples of how power authorities have achieved excellent outcomes by thoroughly de-risking their energy auctions. The United Arab Emirates (UAE) adopted an auction design that meant the bidder would need to focus only on the cost of equipment, installation, and operations on a desert site provided by the government. The combination of land provision and a stand-by loan package has underpinned record-breaking low bids for UAE. In late 2019, the latest auction resulted in a tariff of US$ 0.0169/kWh for a 900MW solar park.[20]

India de-risks its auction by putting the system online. It has since realized the consistent benefits from focusing on transparency. Just as important, given the poor payment history of the state electricity boards, India decided to reduce payment risk by having the Solar Energy Corporation of India (SECI) process all the PPAs and guarantee timely payment.

In Indonesia, de-risking can start by ensuring that the PPAs are standardized and risks are allocated fairly. A number of developers have often voiced concern about specific clauses within the PPA that have pushed developers to the edge. An example given is a one-sided termination clause, whereby PLN has an option to buy out a project at a low equity return in the case of defaults, or at any time of PLN's convenience without the IPP's consent. Such unilateral buy-out clause presents a huge compliance risk and is deemed as unacceptable for certain type of developers.

Make or Break Design Decisions for Indonesia—Getting the Off-Take Commitment and Permitting Process Right

Based on our review, it is clear that across all incentive schemes—whether a FIT or auction—simplifying and streamlining the permitting process and confirming grid

[20] Alternative Energy. High Five: Dubai Receives Record-Breaking Low Bid for MBR Solar Park. 15 October 2019.

access are key goals.[21] In the German FIT case, one reason that its Renewable Energy Resources Act (EEG) succeeded was the guaranteed connection and purchase duty for the operators. Electricity grid operators are obliged to feed their grid from renewable sources, and any excess cost will be passed on to consumers.

Germany also has a unique feed-in management rule. Renewable energy providers are allowed to temporarily disconnect from the grid, should there be an overload in the grid system. The power produced will still be paid for, regardless. This means neither the system operator nor energy providers are disadvantaged, and grid stability is prioritized. Of course, the fact that German's grids are interconnected with a very stable European grid system increases higher penetration of intermittent renewable energy.

While the significance of grid connection to developers seems obvious, this issue continues to challenge many programs designed to accelerate renewable penetration into the grid. PLN is known to have rejected PPAs for renewables based on perceptions of cost, the risk of system instability, and concerns about the local area load profile.

Based on PLN's track record, we believe that the issue of curtailment risk, a fall in the in the amount of energy supplied by a generator to the electrical grid, for renewable IPPs in Indonesia will require careful evaluation and regulatory support. Regardless of whether MEMR proceeds with a FIT or auctions, it would be better if PLN could provide a grid study before procurement is negotiated.

The significance of this issue cannot be understated due to current operational practices at PLN. Each PLN grid division (both running the transmission and distribution) is evaluated by key performance indicators (KPIs) focused solely on the provision of stable and reliable electricity at the lowest possible price, but many of Indonesia's grids are outdated. The substations are old and overloaded, and PLN's technical ability to dispatch power from complex energy sources is not uniform throughout the archipelago.

As a result, if a renewable FIT or auction process doesn't take PLN's operational practices into account, then PLN's willingness to purchase the power will be low. There is also a systemic bias against new clean energy sources due to the fact that a number of Indonesian renewable PPAs are 'take and pay' contracts. Or at best IPPs could be given a combination of minimum dispatch and a take and pay for the excess produced power. This means the utility only has to pay for the power it takes, making it easier for PLN to put renewable sources at the bottom of the merit order if the grid has a high proportion of 'take or pay' fossil fuel baseload capacity. Take or pay contracts require the buyer to pay for contracted power whether or not it is taken into the grid.

PLN experienced a complicated grid problem when the first 75MW of wind power came into the Sulawesi grid in 2018, and with the first 5MW of solar power into the

[21] USAID. Designing Renewable Energy Incentives and Auctions: Lessons for ASEAN. September 4, 2017.

Kupang grid in 2015. In the dysfunctional grid systems that plague most Indonesian islands, where there is no incentive or penalty for not dispatching renewables, curtailment remains a risk that would have to be borne by IPPs. This risk is exactly what makes financiers charge developers more for financing.

Grid investment to improve system's strength and flexibility should never be underestimated. But more importantly, PLN's procurement should not stop just because their system is not ready. There are many technical solutions that can be offered while the grid is being prepared, and finding them should not be problem.

Auction or FIT? Indonesia's Bankers Don't Care

It is commonly assumed that bankers' risk appetite—and access to finance—would be a crucial element in clean energy pricing. But discussions with Indonesian banks suggest they are less sensitive to the details of a FIT or auction than may be the case in other markets. Based on interviews with local corporate and project finance bankers, it appears that they simply do not focus on the power procurement process in itself. What financiers DO care about is the feasibility of the venture—that the project has enough cash flow to service its debt; that the financial health and creditworthiness of the project sponsor is assured; that recourse is provided; and the curtailment risk has been mitigated, especially if the PPA is take and pay.

Since pure project finance deals are rare in Indonesia, many local banks rely on corporate guarantees and fixed asset collateral when it comes to managing the risk of curtailment. Having a take and pay contract with PLN is deemed to be not safe enough to guarantee the loan repayment without additional credit support. Often the banks ask for additional recourse, such as revenue pledges coupled with expensive insurance. This is costly for small and medium players to handle and has become one of the barriers to scale.

The impediment to the development of renewable energy in Indonesia also lies on the terms and conditions of the PPA. Policy makers sometimes miss the onerous terms and conditions that can be hidden in long documents and are seen as additional risks to power project developers. In fact, some bankability issues are not related to unfavorable tariffs but rather are caused by stringent terms and conditions covering off-take risk, *force majeure*, termination risk, and in some projects foreign exchange risk.

One banker commented that "We assumed that all developers would have done their own calculations before bringing a loan proposal to our institution. Hence if the tariff does not make sense to their investors, they would simply not proceed with the project and will not have taken the proposal to a bank."

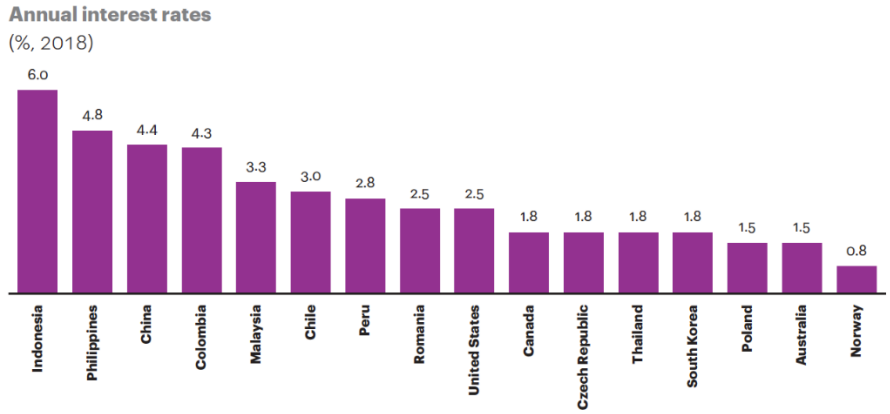
Another bankability issue relates to the Build Own Operate Transfer (BOOT) scheme that is applied to Indonesian renewable projects. This is especially important for projects that will seek to refinance in the future. The BOOT scheme basically limits the ability of owners to refinance their projects, and brought down the book value of their assets to zero at the end of the PPA period.

The Overall Cost of Capital Is a Major Determinant of Clean Energy Pricing in Emerging Economies

Why is the cost of renewable generation, especially wind and solar, still considered too high to beat coal in Indonesia? The low cost of domestic coal is one answer. Bloomberg New Energy Finance (BNEF) in 2019 shed some light on another aspect of the problem. The cost of capital, represented by the weighted average cost of capital (WACC), is typically a lot higher for emerging economies compared to developed economies, or even some other developing economies.

The chart below compares the cost of debt (for a USD loan) between emerging countries. Indonesia is ranked as the highest among its peer group. For a typical commercial IDR loan, the interest rate would be much higher, ranging between 10-14% currently.

Figure 6: Interest Rates in Indonesia Are Higher Than in Peer Countries



Source: Trading Economics; AT Kearney Analysis 2019.

Renewable generation is capital intensive, with virtually no operating costs. The project cost mostly relates to capex, which consists of two basic components: the cost of buying and erecting equipment and the cost of finance. BNEF found there is a direct relationship between the cost of capital that developers can access in a country and the benchmark for levelized costs for renewable generation. BNEF concluded that lowering the cost of capital, through innovative financial instruments such as concessionary financing, could be one way to address the problem.

Figure 7: Financing Cost Impacts on Levelized Cost of Energy—Solar and Wind

Figure 26: Financing cost impacts on levelized costs of energy, utility-scale PV

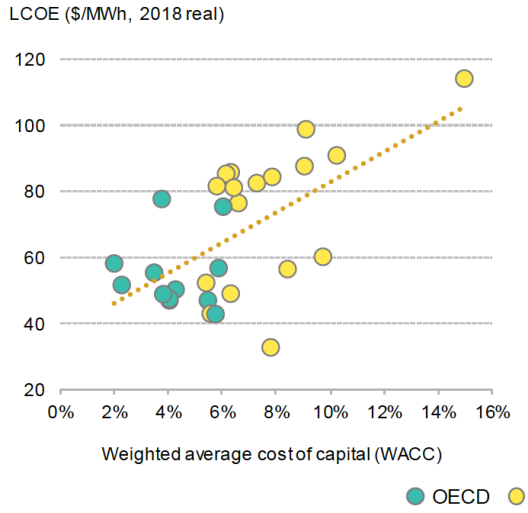
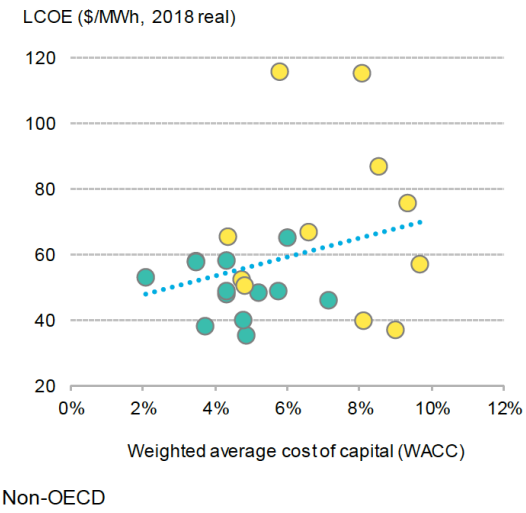


Figure 27: Financing cost impacts on levelized costs of energy, onshore wind



OECD Non-OECD

Source: Bloomberg New Energy Finance. Emerging Markets Outlook 2019. November 25, 2019.

This brings the argument to the macro-economic level. It also raises the question whether the Indonesian government would be better off spending more time trying to come up with innovative financing schemes that would bring the WACC down than tinkering with a FIT to offset high financing costs.

Support Small and Medium Developers With Tailored Programs, Not Special Terms

One challenge to any new clean energy program in Indonesia would be to address the diversity of the developer pool and special consideration of financial or operational capability. Small and medium local players often feel disadvantaged in competitive bidding processes but can contribute to market development if given targeted assistance that preserves market integrity. Many of them have inadequate equity capacity, limited access to financing, and weak sponsor support to provide recourse.

Small and medium local players often feel disadvantaged.

The government can promote domestic players with specific capital subsidies and fiscal incentives such as tax breaks and soft loans through domestic banks. The capital subsidy could also be provided through a pre-development fund or viability gap fund to preselected candidates that have been filtered by the ministry. This type

of support was debated in the recent past when the Ministry of Finance was considering the development of special renewables support funds.

Another way to help small and medium players could be through a government-backed guarantee fund. This is something that could attract support from international donors keen to support Indonesia's transition to renewable energy. Correctly structured, a guarantee fund could support small-scale developers with specialist skills such as those able to help develop a distributed renewables market like microgrids.

A guarantee fund could support small-scale developers.

Last, support could also be extended to local equipment/technology industries such as solar panel producers and turbine manufacturers. If Indonesia is serious about strengthening its local content, any support for local industry to enable it to scale up could result in competitive prices in the long run.

The Ministry of Finance would prefer if support could be given on the upstream side to lower project development cost, rather than providing long-term support on the downstream side through tariff subsidy. The risks and costs would be much lower for the state budget.

Zulvia Dwi Kurnaini, Head of the Subsidy Analyst Group in the Ministry of Finance Fiscal Policy Agency, has made it clear that in the future, getting the right market price for electricity is a priority, while protection for the poor might be done through direct subsidy to each family rather than through a national policy of subsidising electricity.

Focus on Cost Competitiveness for the Long Term, Not Only for Quick Wins

The Indonesian government needs to focus on developing the long-term potential of renewable energy in Indonesia. While a targeted FIT program may offer a safe starting point, sustainable market development will require more competitive pricing and the disciplines best established via an auction process. Other countries' experience shows that if the goal is to achieve the lowest possible price for renewable energy and to reach 23% renewable energy by 2025, then a transparent and well-designed competitive auction should be pursued both for utility-scale and small- and medium-scale renewable energy technology. The government could also choose to do a grid-specific, technology-agnostic auction, if the goal is to prioritize pricing.

The government would also need to decide on whether to invite investment from bigger international players that can leverage financing to bring down costs or to insist on local ownership and boost local employment. A combination of both could

also be considered, with a carefully designed auction weighted to support local development criteria.

IEEFA recommends the government consider some specific condition in relation to the new Presidential Regulation. In the case of FIT, it should be technology specific, volume capped (until a certain volume is reached) with a limited implementation period. The regulation should clearly state the exact date of expiration for the FIT program, and the transition phase towards transparent competitive auctions. Such a statement is important to prepare investors and industry players to step up and be ready to compete. If the FIT route is taken, it should be a staged down or step-down FIT.

IPPs should be pre-qualified, including their legal and financial health, technical capability, and compliance with environmental safeguards. If the government opts for auctions sooner rather than later, it is important to make sure that the process is transparent and provides a breeding ground for competition, with smart terms and conditions.

Regardless of FIT or auction, to attract scalable renewable energy investment into Indonesia, the government and PLN needs to improve the bankability of the PPAs by enabling certain conditions such as a USD tariff indexed to inflation, priority dispatch for renewable energy, and a standardized PPA with fair risk allocations. *Force majeure*, termination clauses, and refinancing or share transfer restrictions needs to be fair for both developers and PLN.

Annex

Country	Period	Instrument Used	Type	Specific Terms & Conditions	Successes	Price	Shortcomings	Move Forward
Germany	1991 - 2000	Electricity Feed-in Act	Fixed feed-in tariff	1. Obligation for grid companies to connect all renewable power 2. Priority dispatch for renewables 3. Guaranteed fixed FiT for 20 years 4. Tariff was tied to the prevailing electricity price	250 MW of wind		1. Coupling of the FIT to the electricity price proved to be too volatile to ensure investment security. 2. Uneven distribution of burden to grid utilities. Grid operators in high-wind regions had to pay more.	Realising how much subsidies burdened the state budget, the government started to implement creative feed-in tariff scheme.
	2000 - 2017	Renewable Energy Sources Act (EEG 2000)	Innovative FiT	1. Investment protection through guaranteed FiT and connection requirement 2. Surcharge arising from penetration of renewables are taken by consumers, not subsidized by public finance/tax 3. Innovative feed-in tariff scheme: tariff regression per year based on maturity of technology; different FiT for different scale and different energy yield			Surcharges from renewable generations are passed onto customers, making Germany's electricity price among the highest in the world.	Realising that the market has responded well with renewable technologies and innovations have brought renewable technology prices down, government started to shift to auctions to discover new price of the technologies.
	2017 - Now	Renewable Energy Sources Act 2.0	Competitive auction to set level of funding for tariff	1. Level of funding for tariff is set by auction (instead of by government)				
Mexico	Nov 2015 - Now	Long Term Power Auctions (LTPA)	Auction	1. Power retailers announce their demand for energy (MWh), capacity (MW) and Clean Energy Certificates (CEC) to be auctioned by an independent System Operator (ISO) 2. Contract for 15-20 years for CECs		Lowest price in 2017 was US$ 0.001918/kWh	1. Bid winners have been finding a hard time to secure construction permit due to rent seeking attitude from local government. 2. New government is thinking to produce its own electricity instead of opening up more to private players. 3. Inability of the grids to cope with new generation capacity has halted new auctions.	
South Africa	2009 - 2011	Renewable Energy FiT (REFITs)	Fixed feed-in tariff	1. Tariffs were designed to cover generation costs + real return on equity of 17% with inflation indexation	None	wind US$ 0.156/kWh; concentrated solar US$0.26/kWh (with 6 hours storage); solar PV US$ 0.49/kWh	1. Though the FiT offered was generous, not a single megawatt was signed off under the FiT scheme. This is due to uncertainties including legality of feed-in-tariff with South Africa's procurement regulations, and delays in finalizing PPA and interconnection agreement with Eskom 2. Practical procurement process was never implemented	After 2 years of FiT in place without any result, the government quickly switched to competitive auctions

Country	Period	Instrument Used	Type	Specific Terms & Conditions	Successes	Price	Shortcomings	Move Forward
South Africa (continued)	2011 - Now	Renewable Energy Independent Power Producer Procurement (REIPPP)	Competitive auction	1. Technology specific with volume capped auction 2. Two stages selection process: a. Bidders need to meet minimum requirement criteria set on legal, financial, technical and environmental b. Bidders compete on 2 sets of selection criteria: Price (valued at 70%) and economic development criteria including job creation, enterprise development, and local content (30%) 3. Termination of contract for bidders who fail to meet their commitment as set in PPA 4. Bidders could bid for more than one project and different technologies 5. Projects had to be larger than 1 MW, and an upper limit was set for different technologies (e.g. 50MW cap for concentrated solar, 140 MW cap for a wind project) 6. Price caps were specified for different technologies, many of which are much higher than Eskom's average generation tariff at the time of around US$0.005/kWh. 7. 20 years with local currency denominated PPA	2011 auction - 1,416 MW (no cap) 2012 auction - 1,044 MW (volume cap) 2013 auction - 1,165 MW valume cap)	2011: wind US$ 0.17/kWh; solar PV US$0.41/kWh; CSP US$ 0.40/kWh 2012: wind US$ 0.13/kWh; solar PV US$ 0.25/kWh; CSP US$ 0.38/kWH	1. High transaction cost to hire a large legal, technical, financial and governance evaluation team to help the Department of Energy to design, prepare and review the initial bids. However, transaction costs were much lower in subsequent rounds. 2. Eskom had attempted to run a number of IPP Procurements before, but all failed. The DOE and the National Treasure finally took control and run the auction.	
Vietnam	June 2017 - June 2019	Solar FiT	Fixed feed-in tariff	1. FIT is valid only for projects that can commence operation before 30 June 2019. If such deadline is missed, the IPP could lose its agreed FiT price 2. No guaranteed offtake from EVN	4.4GW of solar PPAs were signed during 2017-2019	US$ 0.0935/kWh	A surge of solar installations caused grid problems. Not all of Vietnam's grid were able to take such amount of intermitten source. Hence the move toward grid-hub auction.	
	Nov 2018 - Nov. 2021	Wind FiT	Fixed feed-in tariff	1. FIT is valid only for projects that can commence operation before 1 November 2021. If such deadline is missed, the IPP could lose its agreed FiT price 2. FIT is valid for 20 years 3. No guaranteed offtake from EVN		Before 2018: US$ 0.0078/kWh After: US$0.085/kWh (onshore) and US$ 0.098/kWh (offshore)		
	June 2019 - Now	Competitive auction	Competitve auction at grid hub					
Malaysia	2011 - 2015	Feed-in tariff	Fixed feed-in tariff	1. RE Fund is the funding sole funding source to cover surcharge from FIT. 2. FIT fund source is limited to 1% of revenue generated from electricity sold to end users. 3. FIT is differentiated for every technology and scale. 3. Degression rates are applied to the FIT depending to each technology. 4. The FIT was designed with the main objective of achieving grid parity.				

Country	Period	Instrument Used	Type	Specific Terms & Conditions	Successes	Price	Shortcomings	Move Forward
Malaysia (continued)	2017-2020	Large Scale Solar (LSS) tender	Technology specific auction	1. Foreign participation is capped at 49% equity interest in the bidding consortium. 2. Sealed bid 3. Applied size limit per project tendered (50MW in 2016 and 30MW in 2017). 4. For 3rd auction, maximum size a company could bid was 100 MW, and each developers have a chance to bid for 3 assets. 5. Successful applicants for pre-qualification should undertake a power system study (PSS) - which should then be submitted along with the bids. 6. Full compliance with Malaysian Grid Code and Transmission System Reliability Standard (TSRS) is mandatory. 7. EPC employs only Malaysian workers.	2016 auction secured 200 MW capacity + 50 MW in Sabah 2017 auction secured 360 MW + 100MW in Sabah and Labuan 2019 auction secured 500 MW	Lowest price in 2017 auction US$ 0.078/kWh Lowest price in 2019 auction US$ 0.042 - 0.057/kWh		

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The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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