Cheaper Finance is Key to Lowering RE Tariffs in Indonesia

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Indonesia's energy transition has been mired in regulatory and market-related challenges that have precluded large-scale solar and wind capacity deployment (Dutt, Chawla, and Kuldeep 2019). Renewable energy (RE) capacity awarded to developers over the course of 2019 and 2020 (till June 2020) has been only 200 MW. This includes 50 MW solar capacity in Bali and a 145 MW floating solar project in Wast Java.[1]

Unviable tariff caps and challenges in land acquisition are two of the major challenges. This issue brief examines the role of the high costs of domestic finance and land in pushing up renewable energy (RE) tariffs (beyond regional tariff caps). This is done by first analysing a specific project where these constraints do not apply: the 145 MW floating solar plant jointly being developed by PLN (Indonesia's integrated state-owned power utility) and Masdar at a tariff of USD c 5.8/kWh (PPA signed in January 2020) (BKPM 2020). This tariff is around 26 per cent lower than Indonesia's average generation cost of USD c 7.86/kWh in 2018 (Foreign and Commonwealth Office 2019).

The issue brief then illustrates that a 22 per cent reduction in tariffs for land-based utility-scale projects is possible, if financed on terms similar to the 145 MW

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floating solar project. Given the critical role of cheaper international finance in lowering RE tariffs, the brief offers recommendations for de-risking RE investments in Indonesia and attracting international capital.

Competitive advantages of the floating solar project

The 145 MW floating solar plant is to be developed on the Cirata Dam in West Java, which also hosts a 1 GW hydro project owned and operated by a subsidiary of PLN. Since PLN already owns the hydro project, it would not have to bear any additional costs for leasing out space on the lake for setting up the project. This enables the developers to save on land-related costs, which amount to 20–30% of the capex of comparable projects developed on land in Java (if land were to be acquired).[2]

> Land costs can amount to 20-30% of the capex of land-based utility-scale projects in Java.

While specific information on debt financing has not been publicly disclosed, it is assumed that the debt capital for the project will either be raised by Masdar on its own balance sheet or that its repayment (if raised at a special purpose vehicle (SPV) level) will be guaranteed by it. As Masdar is a state-owned entity, the debt is assumed to be raised at close to the sovereign borrowing rate for the Abu Dhabi government. Masdar's globally diversified portfolio of RE assets mitigates its currency risks. Any residual currency risks are assumed to be loaded on to the return on equity. Lower risks associated with land acquisition translate into lower return on equity factored in by the developers, as derived through the analysis.

This note dissects the floating solar tariff to illustrate the major contributors to the overall tariff. Further, it also demonstrates the contributions of these variables to land-based utility-scale tariffs. The methodology adopted is the modelling of the tariff or levelised cost of electricity (LCOE) as a sum of its underlying components, based upon the assumptions stated.

Assumptions

This section presents the major assumptions used in the analysis.

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Table 1 Capital and operating expenses

Parameter	Floating solar	Land-based utility-scale solar
Capex (per MW)	0.89 million	0.57 million
Operations and maintenance expenses	1% of capex with 3% escalation	
Land lease (per MW)	—	USD 16,000 with 5% escalation

Source: BKPM (2020), CPI (2020), CEEW-CEF market intelligence

Table 2 Performance parameters of solar modules

Parameter	Floating solar	Land-based utility-scale solar
Capacity utilisation factor	19%	18%
Degradation	0.7% reduction in generation each year	0.7% reduction in generation each year
Project life and PPA length	20 years	20 years

Source: CEEW-CEF market intelligence

Table 3 Terms of financing

	Terms of debt	Pre-tax return on equity	Debt-equity ratio
Masdar-PLN floating solar plant	Interest rate: 3%, Tenure: 18 years	10%	80:20
IPP developer financed by domestic debt	Interest rate: 12%, Tenure: 7 years	18%	70:30

Note: ROE for the PLN-Masdar project is a derived value based upon other project parameters.
Source: CEEW-CEF market intelligence, Markets Insider (2020)

Table 4 Tax regime

Parameter	Value
Corporate tax rate	25%
Tax incentives	Reduction in taxable income by 5 per cent of the investment value per year over six years

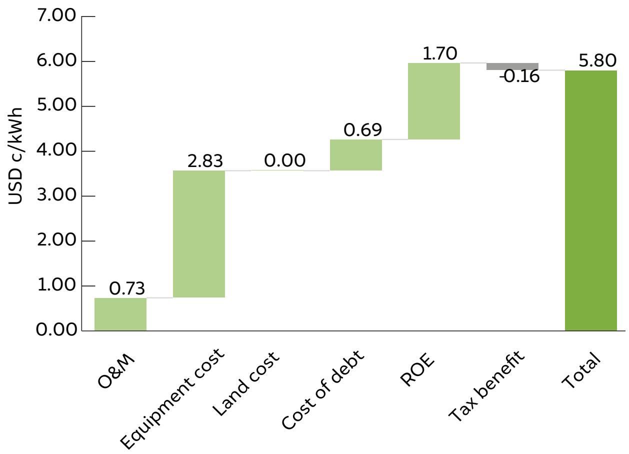
Note: Based on market interactions, it was unclear which tax incentive was being used by developers in practice. This analysis assumes the applicability of the incentives stated under Government Regulation 18/2015.

Source: Deloitte (2019)

Anatomy of the floating solar tariff

Based on the assumptions stated in the previous section, Figure 1 presents a breakdown of the tariff into its major components.

Figure 1 Determinants of the 145 MW floating solar tariff



Source: CEEW-CEF analysis

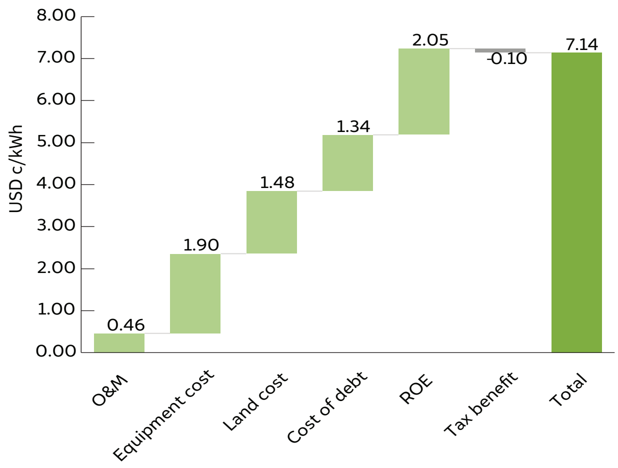
The largest share – 49 per cent – of the LCOE comes from the high capex associated with equipment (solar modules, inverters, floating structures, and other balance of system). The cost of debt and the return on equity account for a combined 41 per cent of the LCOE.

To better contextualise the extent to which financing and land-related costs impact solar tariffs, the following section focusses on land-based utility-scale projects. This helps control for the impact of floating solar specific factors such as higher unit capital expenditure and capacity utilisation factor (CUF).

How do finance and land-related costs impact Indonesia's solar tariffs?

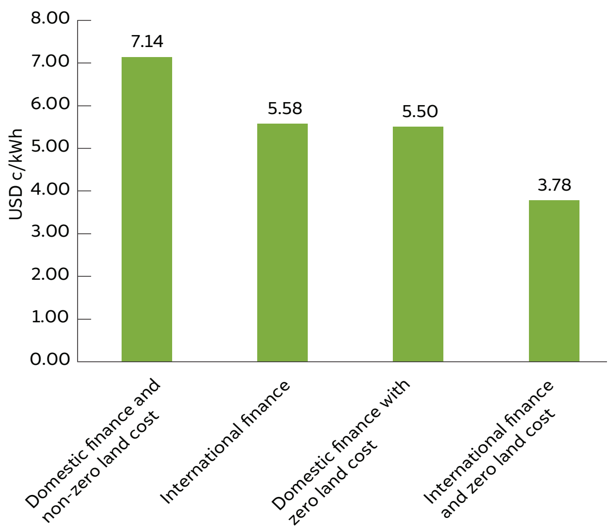
Figure 2 presents a breakdown of the utility-scale solar tariff in Java for a project financed with domestic capital and with land costs also factored into the inputs.

Figure 2 Determinants of utility-scale solar tariffs with domestic finance and non-zero land costs



Source: CEEW-CEF analysis

Figure 3 Variations in utility-scale solar tariffs under various scenarios



Source: CEEW-CEF analysis

Figure 2 shows that finance costs account for around 48 per cent of the tariff, equipment costs (solar module and balance of system) account for around 27 per cent, and land costs account for 21 per cent.

If international terms of finance (the same as those applicable to the floating solar project) were available, solar tariffs would decline by 22 per cent. If land costs were eliminated, tariffs would be 23 per cent lower. If both international terms of finance and zero land costs applied, then the tariff would be 47 per cent lower.

Policy implications

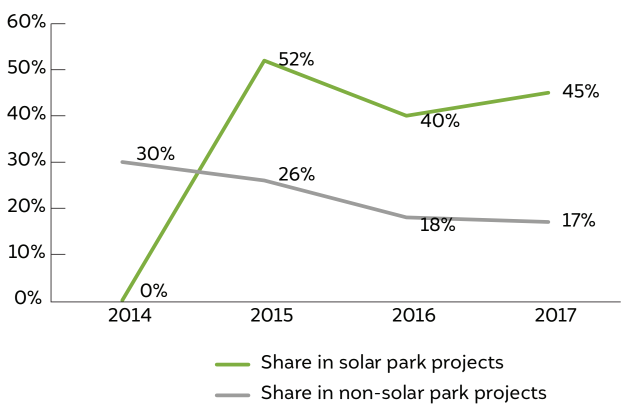
Finance and land-related costs significantly increase RE tariffs. Lowering these costs could enable the realisation of lower power tariffs.

Eliminating land-related risks for developers

To lower land acquisition risks for developers, land aggregation should be taken up by government agencies, as these are best placed to deal with the risks involved. The acquired land could be leased out to the developer for a fee. The removal of the build-own-operate-transfer (BOOT) scheme in February this year could enable even private-sector participants to aggregate land and lease it out to developers (ESDM 2020).

The setting up of large-scale RE parks, which offer a plug-and-play model to developers by providing lots of land and supporting evacuation infrastructure, could be instrumental in lowering land-acquisition risks. While these are unlikely to lower land prices (as parks may have land prices slightly higher than even developer-acquired land), the lowering of uncertainty would lower the cost of finance. These have driven the uptake of solar energy in India and have facilitated the participation of foreign investors (Figure 4).

Figure 4 **Site-wise distribution of international IPP investments in India**



Source: Chawla et al. (2018)

Attracting cheap international capital

Given that financing costs account for the largest component of Indonesian RE tariffs (Figure 2), attracting cheap foreign capital could help bring down RE tariffs. Besides land acquisition, risks pertaining to demand, transmission, and domestic content regulation raise risk perceptions pertaining to RE projects. Systematically addressing these is essential for attracting international capital and realising lower tariffs.

Some potential solutions are summarised below, while both the risks and potential solutions have been described in detail in an earlier report published by CEEW-CEF (Dutt, Chawla, and Kuldeep 2019).

CEEW-CEF recommends: what Indonesia could do to advance RE deployment

- Review existing regulatory structures and address PLN's conflicts of interest
- Create a clear pipeline of RE projects for developers by announcing a multi-year tendering schedule
- Create certainty of demand for RE by
    - Conducting regular tenders for RE procurement
    - Setting renewable portfolio standards for commercial and industrial consumers and PLN
- Review existing capacity-planning methodologies and assumptions to avoid overcapacity in generation
- Address land- and transmission-related constraints by
    - Facilitating RE grid integration using existing flexible sources of generation (gas, hydro, and geothermal)
    - Strengthening existing transmission infrastructure
    - Establishing solar/wind parks
- Review domestic content regulation to boost the viability of projects
- PLN to consider adopting new utility-led rooftop solar business models (being implemented in India) to drive rooftop solar adoption
- Adopt catalytic financing to facilitate the flow of RE investments at scale
- Address the skills gap in the RE sector

Conclusion

While the existing policy landscape precludes large-scale RE deployment in Indonesia, the joint PLN-Masdar floating solar plant demonstrates that RE deployment can occur at competitive tariffs which can lower average generation costs. Attracting international capital is key to realising lower tariffs. To do so, it is essential to systematically address the barriers to RE deployment. An overhaul of existing RE regulation is overdue. A beginning was made in February with the rollback of the BOOT requirement for RE projects. Policymakers must follow through and address other prominent barriers for investors to enable RE deployment at scale.

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CEEW Centre for Energy Finance

The CEEW Centre for Energy Finance (CEEW-CEF) is an initiative of the Council on Energy, Environment and Water (CEEW), one of Asia's leading think tanks.

CEEW-CEF acts as a non-partisan market observer and driver that monitors, develops, tests, and deploys financial solutions to advance the energy transition. It aims to help deepen markets, increase transparency, and attract capital in clean energy sectors in emerging economies. It achieves this by comprehensively tracking, interpreting, and responding to developments in the energy markets while also bridging gaps between governments, industry, and financiers.

The need for enabling an efficient and timely energy transition is growing in emerging economies. In response, CEEW-CEF focuses on developing fit-for-purpose market-responsive financial products. A robust energy transition requires deep markets, which need continuous monitoring, support, and course correction. By designing financial solutions and providing near-real-time analysis of current and emerging clean energy markets, CEEW-CEF builds confidence and coherence among key actors, reduces information asymmetry, and bridges the financial gap.

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