The CEEW Centre for Energy Finance invites your comments on this methodology till 31st August 2019 at cef@ceew.in

Methodology Note

CEF State Rating Tool (Utility-Scale RE)

Measures and compares attractiveness of a state for investment in utility-scale renewable energy projects on a scale of 0 to 5

Utility scale grid-connected renewable energy plants account for an overwhelming share of the total renewable energy installed capacity, and 22 percent of India's installed capacity. While considering fresh capital allocations, investors face a critical challenge in determining the state in which they should locate their assets. The control over the tendering and commissioning of capacity lies squarely with electricity distribution companies (discoms) at the state level, or with central government controlled entities like SECI and NTPC. However, in both cases the demand answer to the supply thus created lies squarely in the hands of private investors who have a multitude of options (states) to choose from. Most such tenders require the plant to be located in a specified state. In some tenders where the power generated is sought to be injected into the Inter State Transmission Network (ISTS), the private investor is free to locate the power plant in any state - meaning that a location specific choice has to be made by the power producer and its investors.

In order to support the investors' evaluation of their options, the CEEW Centre for Energy Finance has developed a framework which allows investors to compare states from the perspective of certain risks. The tool and score specifically assists private investors in answering the fundamental question posed at the outset, namely, "in which state should I locate my solar or wind power plant?". In doing so, we have identified four critical risk categories, i.e., execution risk, O&M risk, offtake risk and credit risk. We measure state specific risks by (1) applying weights to each of these four risk categories (2) Using one or more proxies that best captures the risk sought to be measured under each category (3) Specifying a scoring parameter which finally arrives at a numerical value representing risk (0 = maximum risk and 5 = minimum risk).

Figure 1: CEF state rating framework

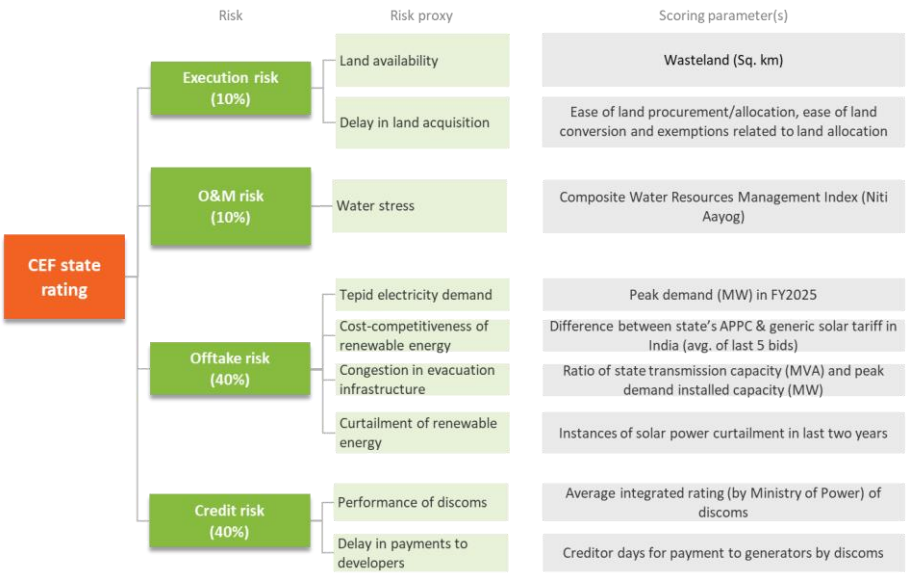

Figure 1 provides an illustrative overview of this approach. Greater detail on the constituent elements of this approach are provided in Appendix 1, including the rationale for choosing each proxy, as well as sources for the parameters being scored.

One of the key findings from this exercise has been scarcity of appropriate data points. For example, comprehensive data related to transmission network availability or details of renewable energy curtailment is simply not available in the public domain leaving us no option but to use (imperfect) proxies in lieu of hard data. As such, we recognise that the tool itself is imperfect in nature and a work in progress. Nevertheless, we hope that even in its present form, it allows investors to make better informed decisions. Most importantly, we hope that it reinforces the need for greater availability and widespread dissemination of data – India's RE targets depend on it.

A rating (on a scale of 0 to 5) based on this methodology has been generated (refer Table 1) with 5 being the best. However, for some of the states/UTs, data is not available for assessing credit risk and therefore these states/UTs have not been considered a part of the rating. It may be noted this rating has been generated based on the weightages as per CEEW analysis, but, the tool provides flexibility for a user to generate new set of ratings by changing the weightages as per his requirements.

Table 1: CEF state rating (Utility-scale)

Rating category	State/UT	Rating
Stars	Gujarat	4.6
	Maharashtra	4.1
	Haryana	3.8
	Punjab	3.7
	Madhya Pradesh	3.5
Good performers	Puducherry	3.4
	Bihar	3.3
	Goa	3.2
	Uttarakhand	3.1
	Kerala	3.0
	Assam	3.0
Average	Andhra Pradesh	2.9
	Uttar Pradesh	2.9
	Rajasthan	2.8
	Chhattisgarh	2.8
	Telangana	2.7
	West Bengal	2.7
	Karnataka	2.6
	Tamil Nadu	2.5
Laggards	Himachal Pradesh	2.4
	Odisha	2.2
	Tripura	2.2
	Jharkhand	1.9
	Delhi	1.8
	Jammu & Kashmir	1.7
	Mizoram	1.5
Not considered due to lack of data	Arunachal Pradesh	No data
	Sikkim	No data
	Nagaland	No data
	Manipur	No data
	Meghalaya	No data
	Lakshadweep	No data
	Andaman & Nicobar	No data
	Dadra & Nagar Haveli	No data
	Daman & Diu	No data
	Chandigarh	No data

Disclaimer

The methodology includes subjective scoring of parameters by CEEW Centre for Energy Finance authors based on consultations from industry experts and publically available information. For example, for assessing likelihood of curtailment, states have been assigned a score (0 to 5) based on number of historical instances of curtailment, relative to others. Therefore, these scores should only be used to discuss relative, and not absolute, opportunities for investing in utility-scale renewable energy projects in a state.

Appendix 1: Rational for risk proxies and scoring methodology

Table 2: Rationale for risk proxies and scoring methodology

S No.	Risk proxy *(Scoring parameter)*	Weigh tage	Rationale	Data source	Scoring (out of 10) methodology
1.	**Execution risk**	**10%**	Execution risk is the risk to timely execution of a renewable project		
1.1	Land availability *(Wasteland in the state in sq. km)*	50%	• Solar & wind power plants require large amount of land per MW of installed capacity, which makes availability of land a crucial risk in project execution. • Wastelands, which are available in large patches in a state may be used as a parameter for land availability.	Wasteland Atlas of India, Department of Land Reforms, Government of India, 2010-11[1]	<1000 sq. km: 0 1000-5000 sq. km: 1 5000-10000 sq. km: 2 10000-15000 sq. km: 3 15000-25000 sq. km: 4 >25000 sq. km: 5
1.2	Delay in land acquisition		• Taking requisite permits/clearances for land acquisition is the time consuming process in project execution. • Therefore, it may be adopted as a proxy for execution risk.		
1.2.1	*(Ease of land procurement/ Allocation)*	20%	• Measures such as single window clearance as well as district-wise land banks (e.g. Rajasthan) are indications of ease of land procurement.	State-specific solar & land related policies/meas ures	Land bank creation: Add 2.5 Facilitation by State Nodal Agency or Single Window Clearance mechanism: Add 2.5 None: 0
1.2.2	*(Ease of land conversion)*	20%	• Agriculture land if acquired, requires conversion to non-agriculture status, that adds to project execution timelines. • Measures such as deemed conversion to non-agriculture status may be used to score the states/UTs.	State-specific solar & land related policies/meas ures	Land conversion not required: 5 Else: 0
1.2.3	*(Exemption(s) related to land allocation)*	10%	• Exemptions such as stamp duty that reduce cost of land acquisition may be used to score the states/UTs.	State-specific solar & land related policies/meas ures	Exemption(s) related to land: 5 No exemptions: 0
2.	**O&M risk**	**10%**	• O&M risk is the risk to optimal generation of power. Renewable power has "must-run" status that mandates off-taker to procure all the power generated, which makes O&M an important risk.		

[1] https://dolr.gov.in/sites/default/files/Wastelands_Atlas_2011.pdf

S No.	Risk proxy *(Scoring parameter)*	Weigh tage	Rationale	Data source	Scoring (out of 10) methodology
2.1	Water stress *(Composite water resources management index)*	100%	• Water stress in a state increases the likelihood of low power generation due to higher degradation of panels owing to poor O&M (particularly for solar panels). • Niti Aayog's Composite Water Resource Management Index that rates the states in India in terms of their water resources and its management may be used as a scoring parameter.	Composite Water Resources Management Index for Indian States, Niti Aayog, 2018[2]	CWMI index (out of 100) / 20. Average score assigned in case of no CWMI index.
3.	**Offtake risk**	**40%**	• Offtake risk entails risk to the power generated to be drawn by off-taker. • Factors such as grid congestion and higher prices of renewable power (typically for PPAs signed before 2016) w.r.t non-renewable power have led to instances of curtailment. • This poses an uncontrollable risk for developers and a high weightage may be assigned to the risk.		
3.1	Tepid electricity demand *(Projected peak demand (MW) in FY2025)*	10%	• Low future demand for electricity in a state (also a function of economic development) exposes the developer to lower off-take. • Thus, projected demand may be considered to score the states/UTs.	19th Electric Power Survey, Central Electricity Authority, India	<1000 MW: 0 1000-5000 MW: 1 5000-10000 MW: 2 10000-15000 MW: 3 15000-25000 MW: 4 >25000 MW: 5
3.2	Cost competitive-ness of renewable energy *(Difference between state's non-renewable*	30%	• Though renewable power has been accorded "must-run" status, there have been instances of back-down restrictions imposed by state distribution companies in few cases[5]. • These have been for commercial reasons where, as	SECI and GUVNL tender webpages	<0 INR/unit: 0 0.0-0.3 INR/unit: 1 0.3-0.5 INR/unit: 2 0.5-0.8 INR/unit: 3 0.8-1.1 INR/unit: 4 >1.1 INR/unit: 5

[2]The index (out of 100) is an indicator of a state's performance in water resource management. Source: https://niti.gov.in/writereaddata/files/document_publication/Final%20Report%20of%20the%20Research%20Study%20on%20%20Composite%20Water%20Resources%20Management%20Index%20for%20Indian%20States%20conducted%20by%20Dalberg%20Global%20Development%20Advisors%20Pvt.%20Ltd_New%20Delhi.pdf

[5]Renew Wind Energy (AP3) Pvt. Ltd. & Ors. v. Rajasthan State Load Dispatch Centre before the Rajasthan Electricity Regulatory Commission, order dated 29 November 2017; Order in the matters of M.P. No. 14 of 2012, D.R.P. No. 28 of 2012, M.P. No. 21 to 23 of 2014 and D.R.P. No. 45 of 2014 – Indian Wind Power Association & Ors. v. TANGEDCO Ltd. & Ors., before the Tamil Nadu Electricity Regulatory Commission dated 1 July 2015

S No.	Risk proxy *(Scoring parameter)*	Weigh tage	Rationale	Data source	Scoring (out of 10) methodology
	APPC[3]& generic solar tariff in India[4])		per merit-order-despatch, preference for offtake was assigned to power source with lower price[6]. • Therefore, the cost-competitiveness of solar power (w.r.t non-renewable power) may be considered as a scoring parameter.		
3.3	Evacuation infrastructure congestion *(Ratio of state transmission capacity (MVA) and peak demand capacity (MW))*	30%	• Transmission infrastructure exposes developer to the risk of technical curtailment due to unavailability or congestion for reasons such as maintenance. • In order to quantify this risk, ratio of a state's transmission capacity (in MVA) and its peak demand (in MW may be used to score each state indicating states with higher ratio having lower chances of grid congestion.	State transmission utility tariff orders and CEA monthly reports	<1: 0 1-2: 1 2-3: 2 3-4: 3 4-5: 4 >5: 5
3.4	Curtailment of renewable energy *(Instances of solar power curtailment in last two years)*	30%	• Historical instances of curtailment in the past by a state increases the likelihood of future curtailment or risk on power offtake. • Due to lack of data on curtailment, states/UTs have been scored based on market intelligence.	Based on interactions with Indian solar developers	High number of instances: 0 Few instances: 2.5 No instances: 5
4.	**Credit risk**	**40%**	• Credit risk encompasses likelihood of payment for the electricity that is drawn by off-taker(s) in a state		
4.1	Performance of discoms *(Average integrated rating (by Ministry of Power) of discoms*	50%	• Payment to RE developers is a function of financial and operational performance of discoms. • Integrated performance rating rates state discoms on key financial and operational metrics.	Ministry of Power State Distribution Utilities Sixth Annual Integrated Rating, 2018	Average scores for a state based on score of each discom has been determined based on the following scoring methodology. C: 0 C+: 1

[3]Average Power Purchase Cost

[4]Average of last five wind and solar bids as of June 2019, that is, SECI Tranche-II (Rajasthan, June 2019, INR 2.50/kWh), SECI ISTS-IV (Across India, June 2019, INR 2.52/kWh), SECI ISTS Tranche - II Solar Wind Hybrid (Across India, May 2019, INR 2.69/kWh), GUVNL Phase II-R Wind Projects (Gujarat, May 2019, INR 2.80/kWh) and GUVNL Dholera Solar Park P-V (Gujarat, May 2019, INR 2.75/kWh)

[6]These have been the cases of commercial curtailment of renewable power for PPAs were signed roughly before 2 years ago or before that at higher tariffs as compared to conventional power (i.e. greater than INR 4-5/kWh)

S No.	Risk proxy *(Scoring parameter)*	Weigh tage	Rationale	Data source	Scoring (out of 10) methodology
					B: 2 B+: 3 A: 4 A+: 5
4.2	Delay in payments to developers *(Creditor days for payment to generators by off-takers[7])*	50%	• Owing to poor financial health of discoms, delay in payments to developers is considered a major risk. • Therefore, creditor days (ratio of outstanding payments for power purchase & yearly power purchase expenditure times 365 days) may be used to score the states/UTs.	UDAY state health cards accessed in June 2019[8] and PFC report on performance of power utilities (2013-14 to 2015-16)[9]	> 240 days: 0 180-240 days: 1 120-180 days 2 90-120 days: 3 60-90 days: 4 <60 days: 5

[7]Electricity distribution companies. Does not include other electricity customers directly procuring power from developers (e.g. - third party sales, captive generation, etc.)
[8]https://www.uday.gov.in/
[9]http://www.pfcindia.com/Home/VS/29