



Power Purchase Agreement (PPA)
Term Length and Prices:
*Memo on behalf of the
Office of Regulatory Staff*

February 22, 2016



Power Purchase Agreement (PPA) Term Length and Prices

The following memo is prepared on behalf of the South Carolina Office of Regulatory Staff (ORS) to examine the relationship, if any, between renewable energy power purchase agreement (PPA) length and the associated contract price or cost. PPAs are the main contract vehicle that independent power producers use to finance, operate, and earn returns on non-utility owned generation. There are a number of different kinds of PPAs that reflect a multitude of different types of buyer and seller needs, requirements, and motivations. ORS agreed to evaluate and compare the cost effectiveness of various solar PPA lengths as part of the Settlement Agreement in Docket Nos. 2015-53-E and 2015-55-E. This memo is based on publically available information and the expertise and experience of Energy and Environmental Economics, Inc. (E3).

Industry standard

Wind PPAs are typically 20 years in length but can be as short as 10 to 15 years. Solar PPAs may be as long as 25 to 30 years, although terms of 15 to 20 years are often quoted and executed. The industry standard for renewable energy PPA terms is usually in the 20- to 30-year range.¹

Figure 1 shows examples of actual PPA contract terms, with their corresponding levelized prices over the PPA term. As seen from the figure, a PPA term of 20 years or more is typical.

¹ Source: http://www1.eere.energy.gov/femp/pdfs/ppa_rfi_summary.pdf

Figure 1. Sample PPA contract details²

Project Name	State	Project Capacity (MW _{AC})	Levelized PPA Price (2013 \$/MWh)	PPA Execution Date & Term	Year Online	State Financial Incentives
Austin Energy/ Recurrent	TX	150	\$41.0/MWh	5/2014 20 years	2016	None
Sandstone	AZ	45	\$44.8/MWh	11/2014 21 years	2015	10-year PTC
Macho Springs	NM	50	\$50.9/MWh	10/2012 20 years	2014	10-year PTC
River Bend	AL	80	\$51.0/MWh	2/2015 20 years	2016	None

PPA term vs. price

A PPA contract helps secure long-term financing for a renewable energy project by amortizing costs over a long-term period, reducing the upfront capital costs. Given that the vast majority of renewable energy costs are associated with the upfront expense of building the plant, anything that affects the capital costs will affect the price of the energy from that plant. Shorter-term PPAs may have higher financing costs because the total capital costs must be recovered in a shorter timeframe. Longer-term PPAs can spread out that initial capital cost recovery over a longer time frame and are likely to have lower financing costs.

Renewable energy PPA pricing can also vary greatly depending on the location of the plant and on whether the PPA was able to capture the recent decline in the price of technology. In general, PPA pricing information is often proprietary or sensitive and, therefore, confidential. However, the following information on the relationship between PPA term length and price is publically available:

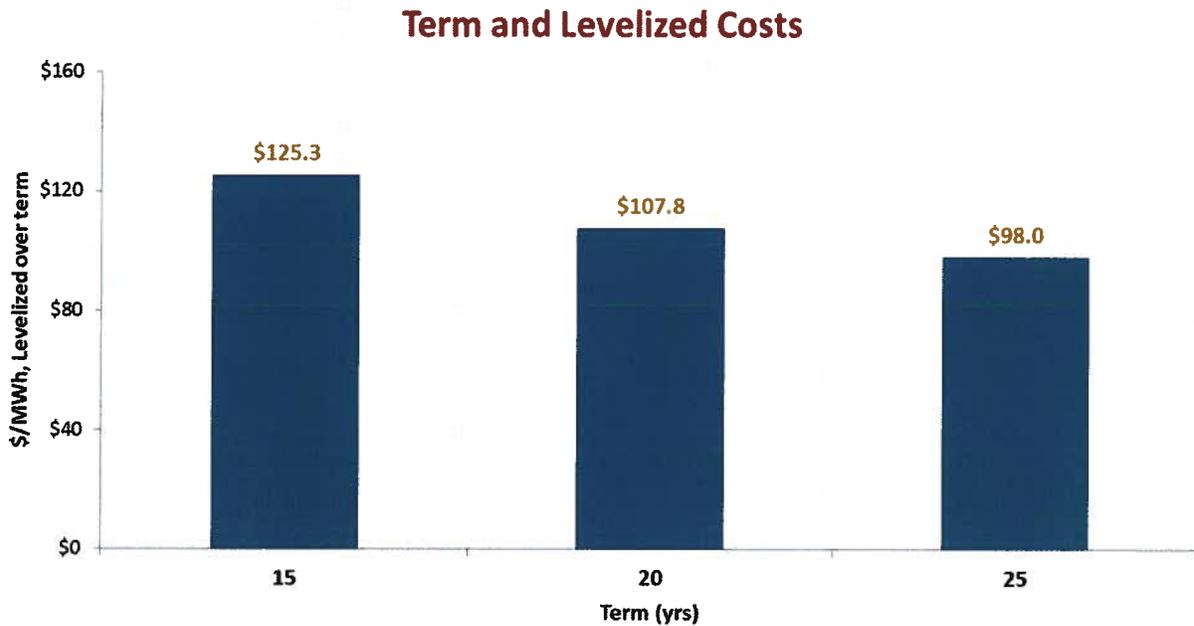
- + 25-65% estimated cost increase for a 10-year versus 20-year contract
- + 15-20% estimated cost increase for a 20-year versus a 30-year contract.³

Figure 2 illustrates the relationship between the term of a PPA and the levelized price per megawatt-hour (\$/MWh) for a utility-scale 5 megawatt (MW) solar PV installation that costs \$2.00/watt (\$10 million in total). A capacity factor of 20% and a weighted average cost of capital (WACC) of 7.00% are assumed.

² Source: <https://eaei.lbl.gov/sites/all/files/lbnl-183129.pdf>

³ Source: http://www1.eere.energy.gov/femp/pdfs/ppa_rfi_summary.pdf

Figure 2. Illustrative example showing a decrease in levelized PPA prices (\$/MWh) with increasing terms (years) due to the greater period of time over which the costs are amortized.



PPA prices correspond with length of the contract term similarly home mortgages where a longer mortgage period gives relatively lower monthly payment requirements. Conversely, if the same costs are recovered over a shorter period the monthly payments will be higher.

However, renewable project developers may quote a PPA price that does not represent 100% of capital cost recovery. An assumption that the PPA will be renewed or that there will be other market-based revenues that will pay for those costs after the initial PPA term has ended can result in breaking the link between greater PPA length and lower prices. On the other hand, shorter-term PPAs may have increased financing costs due to the perception of increased risk that the capital costs may not ever be fully recovered.

Conclusions

- + Financing and building more technologies like wind and solar PV electric generation resources is easier and less costly with longer-term PPAs. Economic theory predicts that shorter-term PPAs should result in higher \$/MWh PPA prices than longer-term PPAs, if all of the capital costs are recovered during the term of the PPA.

- + A number of valid reasons, such as a project developer or financier willing to accept capital cost recovery of less than 100% due to competitive pressure, the state of the market, etc. may subvert the normal link between PPA prices and term lengths.

Entering into shorter-term PPAs that may initially cost more may preserve the opportunity to take advantage of future technology and electricity price declines. For example, a 10- or 15-year PPA can give the buyer flexibility to renew the PPA at the end of the contract term or to pursue lower cost options from the market. Whereas, a 25- or 30-year PPA, which locks the buyer into the contract, could be well above market prices in the future and ultimately a costlier option even if the initial PPA price was lower.

Power Purchase Agreement (PPA)
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Stakeholder Comment Summary

On December 30, 2015, the Office of Regulatory Staff (“ORS”) distributed E3’s memorandum discussing the relationship between the length and costs of power purchase agreements (“PPA”) to a number of stakeholders including utilities, conservation groups, and solar developers. Each party was invited to submit comments in response to the memorandum by February 1, 2016. The excerpts below are extracted from those comments and summarize many of the thoughts that stakeholders have about PPA lengths and prices. The excerpts are not the opinion of ORS but rather reflect the opinions of a variety of stakeholders.

Several stakeholders noted that E3’s memorandum lacked either adequate examples of likely scenarios or a thorough investigation of all variables.

“[T]he E3 memo does not exhaustively explore all relevant aspects of the issues that determine the most cost effective solar PPA lengths...E3 did not provide any supporting research citations or examples of situations where solar developers have been forced by competitive pressures to accept less than complete cost recovery over the duration of a (sic) short-term PPAs.”

“While the impact of increased risk and higher financing costs on the overall level of solar development is clear, the impact on prices cannot be measured by simply comparing prices paid under PPAs of different durations, due to the complications introduced by inflation—a factor which was not fully explored in the E3 memo. The longer the contract term, the greater the impact of inflation on the operating costs incurred by the solar developer, and the greater the impact of inflation on the anticipated future value of power produced by a solar project.”

All stakeholders agreed with E3’s conclusions that longer PPA lengths result in lower prices and are ultimately the result of balancing the seller’s and buyer’s needs. However, the commenters disagreed on which needs should be paramount to the PPA’s design and whether or not those needs can be studied within the general context of E3’s memorandum.

“A PPA is a bilateral agreement that achieves different ends for the respective counterparties, and for whom certain components create relative levels of risk and reward. As such, executed PPAs represent an overall balancing of those risks and rewards between those parties and because of that balancing, individual components or terms of those transactions simply cannot be evaluated in isolation.”

“This possibility [that shorter PPAs preserve the opportunity to take advantage of future technology and electricity price declines] should be examined as part of a comprehensive resource planning process, such as the Integrated Resource Plans (IRPs) prepared by the utilities, before any conclusions may be drawn. Within the IRP analysis, candidate resource portfolios could include solar PPAs of different lengths. These candidate portfolios could then be evaluated across various scenarios to help characterize risk, just as other uncertainties such as fuel prices and load growth are explored.”

However, another commenter raised concern that setting prices based on anything other than actual costs increases risk.

“This risk shifting from project investors to utility customers is exacerbated when the prices are not based on the actual revenue requirement of the project itself, but are rather derived from a projected market or marginal cost-based forecast, as with utility avoided cost rates offered under PURPA. In that scenario, customers ultimately pay prices today based on forecasts and projected future benefits that may never materialize.”

Comments were also divided as to the appropriate place for risk to be assumed.

“In general, the greater the discrepancy between the longest available PPA term and the actual economic life of a solar project, the greater the risk that must be borne by the solar developer, and the greater the difficulty in obtaining financing for solar projects.”

“When negotiating a solar or other PPA, a utility must balance the willingness of the developer to provide a lower price for a longer term against the possibility that a longer-term PPA will close off lower cost options in future years. There is no one-size-fits-all answer to this question. The answer depends on what each party believes about things such as (a) future inflation, (b) future fuel costs, (c) the rate at which solar technology prices will decline and solar efficiencies will improve, (d) how the generation mix, capacity needs, and capacity costs will evolve on the utility’s system, and (e) how environmental, regulatory and siting restrictions will affect the value of electrical energy and capacity from renewable sources in the future. All these factors must be evaluated in light of the fact that the cost of power purchased under a PPA is passed on to customers. Customers ultimately have the greatest stake in not locking utilities into PPAs that prove to be mispriced.”

“Very simply, the more power procured under longer term PPAs today means the less power that can be procured under more attractive prices, that will benefit customers, in the coming years and the longer those customers will be paying potentially out-of-market rates for power. In this way, longer term PPAs shift more performance and price risk from the project developers and investors to the utility customers than shorter term PPAs.”

Two commenters noted that while this discussion is worthwhile, it is not one that is new to South Carolina or one that is likely to be resolved immediately.

“Instead of mandating the terms of PPAs, the Commission has consistently chosen to rely on negotiations in which the utility can balance its best assessment of the risks of extending the length of the PPA against the price benefits offered by the developer for doing so...In sum, the [m]emorandum is quite perceptive in recognizing that the regulatory policies that led the Commission to rule as it did in the prior orders are still compelling today.”

“While the question of PPA lengths has been settled for the purposes of utility DER programs under Act 236, solar PV and other renewable energy PPAs will play increasingly important roles within utility resource planning moving forward, and evaluating different PPA options will be a key task for utilities, regulators, and stakeholders.”