Lloyd Gosselink
ATTORNEYS AT LAW

816 Congress Avenue, Suite 1900
Austin, Texas 78701
512.322.5800 p
512.472.0532 f
lglawfirm.com

Mr. Brocato's Direct Line: (512) 322-5857
Email: tbrocato@lglawfirm.com

May 6, 2022

VIA EMAIL

Rate Review Administrator
rate.filings2022@austinenergy.com

RE: Value of Solar Report

Attached please find the Review of Austin Energy's Value of Solar report and Avoided Cost Base Component of the Value of Solar Credit memorandum prepared by NewGen Strategies & Solutions.

These documents were inadvertently omitted from Austin Energy's Base Rate Filing Package submitted on April 18, 2022. They should be inserted behind page 599 of the Base Rate Filing Package and identified as Appendix M.

Sincerely,

Thomas L. Brocato

Encl.: Appendix M.

TLB/pem
749/36/8410439

NewGen Strategies & Solutions
8140 North Mopac Expressway
Suite 1-240
Austin, TX 78759
Phone: (512) 806-7713

Memorandum

To: Austin Energy

From: NewGen Strategies & Solutions

Date: February 8, 2022

Re: Review of Austin Energy's Value of Solar

Introduction

Austin Energy retained NewGen Strategies & Solutions (NewGen) to review the formulation and basis of Austin Energy's Value of Solar (VOS) program. To remark on the validity and appropriateness of Austin Energy's VOS program, we've split the discussion into the following tasks:

- Task 1: Review current components of the VOS credit and determine if the components and approach remain valid and/or if components should be added, removed, or changed; and
- Task 2: Review the current state of the industry on solar policy.

Summary of Findings

Austin Energy has established policy goals for the installation of solar generation (i.e., photo voltaic (PV) systems) – both overall locally and specifically customer-sited. The VOS credit is an element of consideration provided to customers to assist Austin Energy in achieving these goals. Currently, the VOS credit is based largely on forward-looking marginal cost avoidance. However, to the extent the VOS credit is greater than the direct economic savings to Austin Energy, the VOS credit results in a subsidy from non-PV customers to PV customers. Further, it may be possible for Austin Energy to achieve its overall solar generation policy goal at reduced cost by procuring utility-scale PV in lieu of supporting customer-sited PV. In summary, the appropriate basis for the VOS credit is a policy decision regarding the appropriate balance between equity (i.e., minimizing the subsidy) and attainment of the specific customer-sited PV goals. If Austin Energy decides to reform its current VOS credit to minimize the subsidy, it should consider a transition plan to lessen the impact on existing PV customers over a reasonable period of time.

Background

Austin Energy offers a VOS tariff for those households and businesses that have PV installations. This tariff represents a "buy-all/sell-all" arrangement whereby a customer purchases all energy consumed at the premises at the Austin Energy retail rate and the utility then pays the customer for all energy generated by the PV system at the then effective VOS credit. Austin Energy has different VOS credits based on the type of customer and size of the PV system. One VOS credit applies to customers with a non-demand base rate design (largely residential customers). Two other VOS credits apply to customers with demand base rates, depending on the PV system size. Regardless of the customers' base rate design, all VOS credits are on a dollar per kWh basis. It is important to note that the VOS credit is calculated based on a

Memorandum

marginal cost, rather than embedded cost, analysis. Embedded cost analyses are commonly employed for cost of service studies to ensure the utility recovers its existing costs. Marginal cost analyses consider the incremental costs of future investments (e.g., capacity costs).

NewGen has provided input and recommendations with respect to the impact of customer-sited PV on Austin Energy's avoided costs. We have not quantified societal costs given their subjective nature.

Approach to VOS Credit

There are at least two approaches Austin Energy could employ when establishing the VOS credit. One is an incentive policy (which may include consideration of subjective societal benefits above and beyond estimated cost savings attributed to the electric system) and the other is strictly a calculation of estimated cost savings (i.e., cost avoidance) to Austin Energy as a result of the generation from PV systems. The basis for Austin Energy's existing VOS credit has evolved over time, but the current non-demand VOS credit is tangentially tied back to the five primary components outlined in Appendix A to Austin Energy's tariff (and listed in Table 1). These five components include direct economic benefits with some additional recognition of environmental value. Some of the components that have historically been calculated are based on assumptions that may no longer align with Austin Energy's underlying costs and some components rely on benefits to society, which do not directly lower Austin Energy's cost of service.

To be clear, either approach if conducted in a transparent and well-informed manner may be acceptable and appropriate for Austin Energy. However, to the extent the amount paid to customers through VOS credits exceeds the direct economic savings to Austin Energy, the VOS credit will result in non-PV customers subsidizing PV customers. Further, to the extent a subsidy exists, as PV penetration increases, so shall the subsidy. At some point the subsidy may reach a magnitude that is not acceptable to policymakers. In recognition of this situation, it may be helpful for Austin Energy to consider the following policy questions:

1. Should non-PV customers subsidize PV customers and, if so, by how much and for how long?
2. Can Austin Energy achieve its distributed renewable energy goals with a VOS credit that is solely based on embedded cost avoidance/savings?
3. How should achieving Austin Energy's distributed renewable energy goals be balanced with minimizing PV customer subsidies?

These are important policy questions that Austin Energy must address to inform decisions regarding the VOS credit. The remainder of this memorandum focuses on the current calculation of the VOS credit, some observations on how this calculation might be modified, and discussion on how retail rate structures for PV customers in the electric industry have evolved over time. NewGen's recommendations are generally intended to make the VOS credit calculations 1) based on actual system data, to the extent the data is available, rather than hypothetical or modeled assumptions; and 2) represent estimated cost savings to Austin Energy as a result of the PV systems, without non-cost-based considerations (e.g., positive externalities).

History

Figure 1 shows the history of the non-demand VOS credit (applicable to residential and small commercial customers) since the program's inception in 2013. In Figure 1, the Implemented Rate represents the non-

Memorandum

demand VOS credit paid to customers over time and the Assessed Rate represents the annual assessment of the VOS credit based on contemporary inputs at the time of calculation in each year.

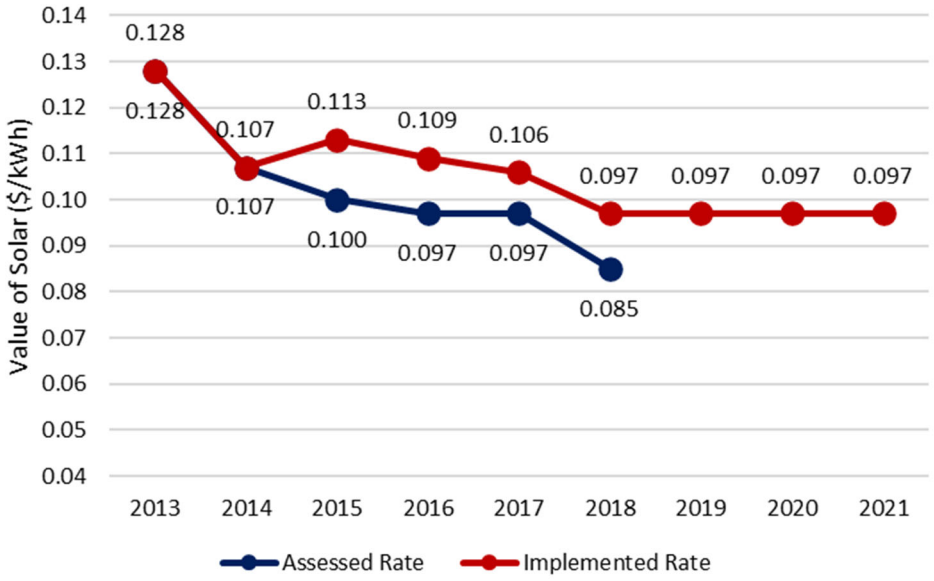

Figure 1: Comparison of Historic Non-Demand VOS Assessed Value and VOS Credit (Implemented Rate)

As shown in Figure 1, the effective VOS credit paid to non-demand PV customers has trended down over time as the calculated VOS (indicated by the assessed value) has decreased. However, Austin Energy's current policy is to evaluate the VOS credit during its periodic base rate reviews. The last update to the non-demand VOS credit occurred in 2018 when the VOS credit was set at $0.097 per kWh, which represented the five-year average of the assessed values (2014 – 2018).

Five components makeup the formula used to calculate the assessed value for the non-demand VOS credit. Table 1 provides a summary of the individual components.

Memorandum

Table 1: Components of Austin Energy's Non-Demand VOS Credit

Value Component	Definition
Energy Value	Estimated avoided cost of energy to meet electric loads as well as transmission and distribution losses, based on the solar production profile. This is inferred from forward projections of ERCOT wholesale price based on future natural gas prices.
Plant O&M Value	Estimated avoided cost associated with natural gas plant operations and maintenance by meeting peak load through customer-sited renewable resources.
Generation Capacity Value	Estimated avoided cost of capital by meeting peak load through customer-sited renewable resources, inferred from ERCOT market price data.
Transmission and Distribution Value	Estimated savings in transmission costs resulting from the reduction in the peak load by locally-sited renewable resources, and savings or costs related capital investments to distribution grid.
Environmental Value	Estimated avoided emissions cost to comply with local policy objectives.

Source: City of Austin Fiscal Year 2022 Electric Tariff, Appendix A

NewGen has reviewed each component of the VOS credit and has provided comments on the underlying assumptions and rationale as appropriate.

Task 1: Review of Austin Energy's VOS Formulation

Before discussing the individual components included in the VOS formulation, we have developed a few high-level comments/recommendations on Austin Energy's overall approach.

1.1 Recommendations on Overall Formulation of the VOS Credit

VOS Credit for Residential and Commercial Customers

Presently, Austin Energy offers three different VOS credit options to customers: Non-Demand VOS (primarily for residential customers), Demand VOS with PV capacity < 1,000 kW, and Demand VOS with PV capacity ≥ 1,000 kW, with the latter two options intended for larger commercial customers.

The Non-Demand VOS option is formulated using five value components (see Table 1). The Demand VOS with PV capacity < 1,000 kW is formulated with only three components and the Demand VOS with PV capacity ≥ 1,000 kW is made up of only two components. Table 2 compares the different components that make up these three VOS options.

Memorandum

Table 2: Comparison of Formulation of VOS Credit Options

VOS Option	Energy Value	Plant O&M Value	Generation Capacity Value	Transmission & Distribution Value	Environmental Value
Non-Demand	X	X	X	X	X
Demand (Capacity < 1,000 kW)	X			X	X
Demand (Capacity ≥ 1,000 kW)	X				X

All three options include the energy value and the environmental value component for their respective VOS credits. However, the Demand with PV capacity < 1,000 kW includes the transmission and distribution value component, whereas the Demand with PV capacity ≥ 1,000 kW does not. Neither of the Demand VOS credits include the plant O&M nor generation capacity value component to their VOS credits. Additionally, there is a difference in the calculation of the energy value component between the Demand and Non-Demand VOS credit, which is discussed below. As expected, the resulting Demand VOS credit is lower than the Non-Demand VOS credit. PV systems ≥ 1,000 kW are required to have an ERCOT meter that prevents Austin Energy from avoiding transmission costs on generation from these facilities. Therefore, the exclusion of the transmission and distribution value component for the VOS credit for these sized systems is reasonable.

Customers qualifying for the Demand VOS credit are charged a three-part rate under their applicable Austin Energy tariff, which includes a demand rate ($/kW) for electricity consumed. Demand rates are typically associated with commercial and industrial electric customers and are a mechanism to recover fixed costs incurred by the utility. Customers with demand rates typically have lower energy rates than those without demand rates. Commercial demand customers are billed on their maximum monthly demands. However, due to a limitation in metering, the monthly maximum demand values for PV customers are reduced by the generation from their PV systems. Therefore, these customers avoid paying demand charges on the portion of their peak demands provided by the PV system. This is a benefit to demand customers in addition to the VOS credit for their PV generation. This nuance also allows some commercial customers that are close to the demand threshold (i.e., kW level) delineating non-demand and demand customer classes to stay in the non-demand customer class (even though their total demand may qualify them for the demand customer class). This outcome is not an intentional feature of the VOS program and, ideally, Austin Energy would bill these customers based on their total demand (in a pure buy-all/sell-all manner). For the purposes of this review, NewGen has ignored this benefit as an unintended consequence of the metering configuration for customers with PV installations and has not attempted to adjust the VOS credit recommendations to account for this benefit. However, Austin Energy should review historical metering data in an attempt to identify the magnitude of this benefit. To the extent this unintended benefit is material, Austin Energy should endeavor to adjust the billing so that demand customers are billed for their total demand (not just the demand net of PV generation). Until this issue is corrected, these demand customers are receiving duplicative benefits – specifically avoidance of the embedded costs in the demand charge plus the marginal costs currently included in the VOS credit.

NewGen recommends Austin Energy adopt a policy that is agnostic to the customer class source of PV generation, whether it be a residential customer on a non-demand rate or a commercial customer on a demand rate, with the exception of those PV systems that are ≥ 1,000 kW, which should exclude the

transmission and distribution value component (as noted above). This would reduce the number of VOS credits from three to two – specifically one for PV systems < 1,000 kW and one for PV systems ≥ 1,000 kW, subject to additional considerations discussed herein. Minor adjustments to reflect the difference in loss factors to account for differences in voltage should be considered; however, this difference may be insignificant and, if so, may not warrant a separate VOS credit for primary voltage customers.

Policy Considerations for Renewable Goals

Austin Energy has adopted renewable energy goals in its "Austin Energy Resource, Generation and Climate Protection Plan to 2030" (2030 Plan). The 2030 Plan includes specific capacity goals for installed solar megawatts (MW) to achieve by 2030 for its "overall local solar" as well as "local solar (customer-sited)" goals. The overall local solar goal includes utility-scale projects, whereas the customer-sited goal is limited to rooftop and community solar projects. According to the latest Renewable Energy Programs Report provided (September, fiscal year 2020), the overall local solar goal of 375 MW was approximately 72% achieved, and the local solar (customer-sited) goal of 200 MW was 46% achieved. Regardless of which metric is utilized, it is apparent that Austin Energy has yet to meet the goals set for 2030.

This is relevant to the VOS credit discussion because the ability to achieve the customer-sited policy objectives is dependent on customers installing solar as a result of their own economic or social decisions. The VOS credit may impact the decision of customers to install future PV systems or to participate in future community solar projects. Therefore, Austin Energy may wish to adjust the calculated VOS credit based on the components listed in Table 1 to incentivize customer-sited PV. Or, in recognition that Austin Energy can more cost-effectively achieve the overall policy goal of increased solar generation by constructing or contracting for one or more utility-scale solar projects given the relative cost of such projects in the current environment (as compared to customer-sited installations and the corresponding VOS credit), Austin Energy may instead opt to procure utility-scale solar projects. This latter approach may result in Austin Energy meeting it system renewable energy goals at a lower cost to ratepayers, but falling short of the individual goal for customer-sited solar.

Use of Theoretical vs. Actual Inputs in VOS Credit Formulation

Actual empirical values are considered more representative than theoretical or estimated values in the ratemaking process. Therefore, for this review, NewGen relied on actual costs and load information to develop the analysis provided herein. Under the current VOS methodology, Austin Energy utilizes theoretical values for the Load Match, or Effective Peak Capacity variable, which is currently set at 50%.[1] This Load Match is applied to the formulas in the VOS credit options for the generation capacity value component and the transmission and distribution value component. The Load Match is used to identify the anticipated reduction in Austin Energy's peak load as a result of the installed solar capacity on the Austin Energy system. This peak load reduction represents less future generation capacity required by Austin Energy and lower transmission charges from ERCOT. The 50% Load Match variable is based on an input assumption in the VOS modeling provided by Austin Energy, which seems to be derived from a theoretical approach.

One issue that arises from the use of theoretical values is whether they match the output from actual conditions experienced by the utility. NewGen examined production data provided by Austin Energy for

[1] VOS_Model_CPRMethod_Simplified_2018Update_2017-05-12_FINAL.xlsx

Memorandum

645 PV systems with consistent generation meter data and for systems which appeared to be less than 1,000 kW capacity for 2020 (Austin Energy System data). This data was compared to the theoretical PV production within the City of Austin from the National Renewable Energy Laboratory (NREL) PV Watts tool.

Figure 2 provides a representation of the average output from the Austin Energy System data (normalized to 1 kW) and a similarly sized system using the NREL PV Watts tool. The time period for this comparative data is the peak days for ERCOT during June, July, August, and September (4 Coincident Peaks or 4CP). The results indicate that the actual system data exhibits lower peak PV production that occurs later in the day than the theoretical data. However, it may be appropriate to evaluate more granular (e.g., 15-minute interval) data to support a decision on which dataset is most appropriate.

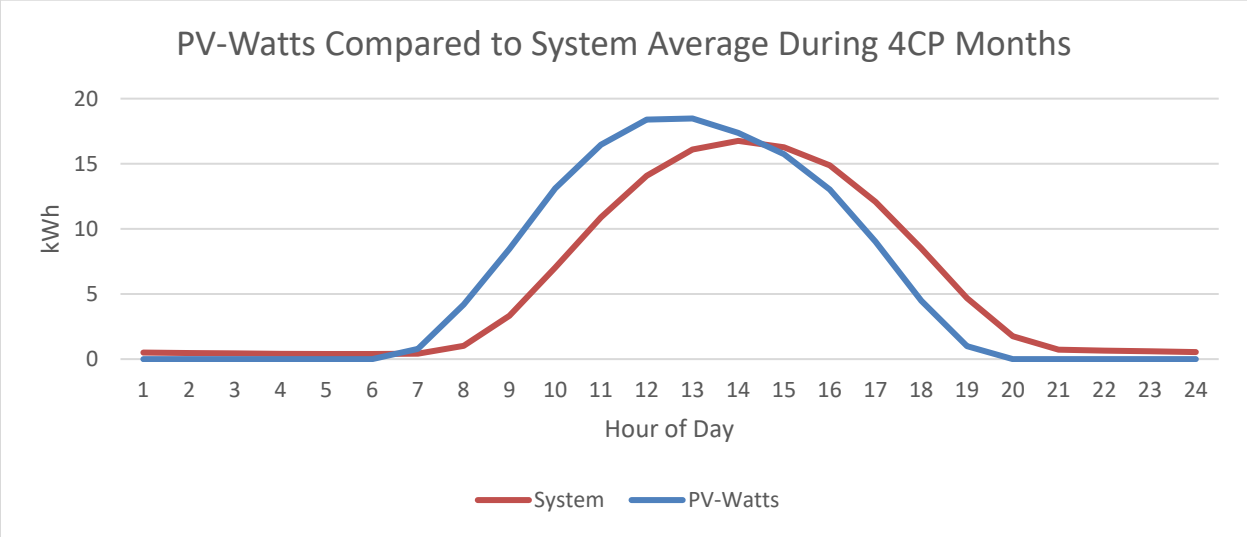

Figure 2: Comparison of Austin Energy System Data (Actual) vs NREL PV Watts (Theoretical)[2]

If Austin Energy is to continue to rely on a forward-looking approach, which will be discussed further in Task 1.2, NewGen recommends that Austin Energy utilize actual production data from its PV customers as the basis for all future VOS calculations, rather than relying on theoretical data. Further, Austin Energy should evaluate if a meaningful difference in Load Match exists between non-demand and demand VOS customers; and, if there is a meaningful difference that should be reflected in the VOS credit, consider maintaining two VOS credits for PV systems < 1,000 kW (one for non-demand and one for demand) with the difference in Load Match being the only distinction. Finally, NewGen recommends that the measured peak generation of the installed PV facilities be utilized as the basis for the installed capacity in the VOS calculations, rather than the nameplate capacity provided during the permitting process. It is important

[2] The purpose of Figure 2 is to demonstrate the general difference between the NREL estimated PV production data and the actual PV production data from a dataset of Austin Energy's customers. However, the actual PV production data used to develop this graphic is not comprehensive and was scaled for comparison purposes. Thus, this graphic is illustrative only and should not be relied upon to develop any of the inputs to the VOS, such as the Load Match.

to note that there should be consistency between the basis for the Load Match and the installed capacity – either theoretical or actual data should be used for both.

Recommendations

- Austin Energy should adopt a VOS policy that is agnostic to the customer class source of PV generation (i.e., a kWh from a large commercial PV system in a certain hour is no different from a kWh from a residential PV system in that same hour).
- Austin Energy should review historical metering data in an attempt to identify the magnitude of the unintended benefit provided to demand customers that are billed for reduced demand as a result of their PV systems. To the extent this unintended benefit can be fixed through Austin Energy's billing system, it should be corrected as this benefit is duplicative of benefits included in the VOS credit.
- If Austin Energy is to continue to rely on a forward-looking approach, Austin Energy should utilize the measured peak generation of the installed PV facilities as the basis for the installed capacity in the VOS calculations, as well as using measured generation as the basis for its Load Match calculation (in lieu of the current 50% assumption).
- If Austin Energy is to continue to rely on a forward-looking approach, Austin Energy should evaluate if a meaningful difference in Load Match exists between non-demand and demand VOS customers to determine if maintaining two VOS credits for PV systems < 1,000 kW (one for non-demand and one for demand) is warranted.
- Austin Energy should evaluate if an incentive policy approach to VOS credit calculation is required to achieve the renewable energy goals identified in its 2030 Plan.

1.2 Energy Value

Including an energy value component, sometimes referred to as the market value of energy, represents standard practice when utilities are formulating the value to credit customers for excess solar generation. However, Austin Energy's approach is not based directly on market energy values but, instead, utilizes an implied heat rate for the system and future prices for natural gas to derive estimated future energy values. The implied heat rate for the system appears to be a function of the efficiency of Austin Energy's collective resources that reflect its variable operating costs on average; however, the detail used to derive the implied heat rate was not provided for this review. The formula for the energy value component of the VOS credit incorporates the anticipated production from PV systems and the estimated future energy-only market prices concurrent with modeled PV production hours. In NewGen's experience, the majority of utilities employ a backwards-looking method whereby the energy value of excess PV generation is determined via historic weighted average energy prices observed in the market.

A backwards-looking approach allows for increased transparency given that historic data is publicly available and typically varies by hour. Austin Energy's forward-looking approach depends on natural gas price forecasts and an implied heat rate to estimate the energy-only portion of the hourly market prices for power. Further, Austin Energy's forward-looking approach for the energy value of its VOS credit is different for non-demand and demand customers. For non-demand customers, Austin Energy utilizes an implied heat rate, whereas for demand customers, it uses an effective implied heat rate. Presuming this

Memorandum

difference in nomenclature is intentional and has meaning, it appears the effective implied heat rate includes a scarcity premium, which is apparently meant to reflect fixed cost recovery (capacity cost recovery) included in the hourly market energy prices in ERCOT. As indicated, it is not clear from the models provided by Austin Energy how the implied or the effective implied heat rate values were derived. However, the effective implied heat rate is higher than the implied heat rate, which results in a higher energy value component for the Demand VOS credit. It appears that this approach is meant to compensate Demand VOS customers for the lack of the generation capacity and plant O&M values in their VOS credit (see Table 2).

There will always be a discrepancy between the actual hourly market value of energy and the estimated (forecasted) market value of energy. A backwards-looking approach allows the utility the opportunity to "true-up" this discrepancy with regard to events that have occurred in the market. The majority of utilities use some variation of a historical energy price average to value the excess generation of a customer distributed energy resource when reconciling a customer's annual bill for any generation above and beyond their total consumption under a net metering construct. However, NewGen is not aware of any municipal utilities that have proposed a true-up mechanism with regard to their valuation of customer self-generation or value of a customer's excess generation credit. Further, a backwards-looking approach must contend with stochastic, extreme events, such as Winter Storm Uri in February 2021, that result in extreme fluctuations in the market price of electricity in ERCOT. To account for these fluctuations, some utilities have developed policies in their solar credit methodologies to exclude periods of volatile pricing. A forward-looking approach benefits from inherent smoothing/damping in forecasted market prices, which minimizes or eliminates the impact of these types of events.

Neither forward- nor backwards-looking approaches to determining the market value of solar generation represent the real-time market value of the PV generation. Forward-looking approaches use forecasts of market prices while backwards-looking approaches use historic averages for market prices. To minimize the discrepancy caused by either method, Austin Energy could separate out the energy value component of the VOS credit and provide it via a pass-through (similar to the Power Supply Adjustment). This would better reflect the actual market price at the time of the customers' PV generation. This pass-through would represent a near-real time (e.g., daily or monthly) true-up for the customer. While this solution would be most reflective of the market value of generation, it could be administratively burdensome to implement and, therefore, is not being recommended at this time.

Recommendations

- Austin Energy should investigate the impact of utilizing a backwards-looking (i.e., historical pricing) approach to determining the market value of energy included in the VOS credit.
- If Austin Energy chooses to implement a backwards-looking approach it should include a condition to mitigate and address any financial exposure to the utility as a result of extreme market events, that PV may not contribute to avoiding.

1.3 Generation Capacity Value

The generation capacity value component is included in the Non-Demand VOS credit, but excluded from the Demand VOS credit (and, thus, not applied to commercial customers billed for demand). This component represents the avoided capital expense of additional generation resources (specifically an assumed marginal combustion turbine) due to the ability of excess generation from PV systems to meet

peak load requirements. Utilizing a combustion turbine as a "marginal" resource is a standard approach to valuing marginal capacity in the electric industry and is supported by the National Association of Regulatory Utility Commissioners (NARUC), many states regulatory commissions as well as the Federal Energy Regulatory Commission (FERC). However, much of the logic behind this support was created prior to the development of wholesale power markets across the country and was historically applied to vertically integrated utility systems. Further, NARUC and others also support utilizing a utility's integrated resource planning documents to determine the marginal resource for capacity valuation purposes. Additionally, if markets provide a capacity payment (such as in the PJM market), those values are generally supported by regulatory agencies and commission staff as well.

A review of Austin Energy's 2030 Plan, as well as discussions with Austin Energy's power procurement staff, suggests that Austin Energy has no plans to build or operate additional fossil fuel powered combustion turbines to meet capacity needs in the future. Instead, Austin Energy's multi-year outlook focuses on procuring additional renewable purchase power agreements across a broad geographic range as well as investigating the option of acquiring a utility-scale battery to help meet peak load requirements. Because Austin Energy does not plan to build/operate an additional combustion turbine resource, it is our opinion that the generation capacity value component of the Non-Demand VOS credit should not rely on cost estimates for these resources.

As indicated, the Demand VOS energy value is based on an "effective" implied heat rate that suggests a capacity value inherent in the market value of energy. NewGen recommends that the generation capacity value be removed from the Non-Demand VOS and replaced with an energy value approach that includes the capacity pricing observed in the market. If a forward-looking approach is retained, this would be similar to the approach currently applied for the Demand VOS energy value component calculation.

Recommendations

- Austin Energy should remove the generation capacity value from the Non-Demand VOS credit calculation and replace the energy value with an approach that includes capacity pricing either in a manner similar to the Demand VOS energy value component under a forward-looking approach, which appears to be a reasonable means to estimate the capacity prices in the market, or via historical market pricing if a backwards-looking approach is preferred. This will make the overall VOS credits more consistent and avoid duplication of benefits.

1.4 Plant O&M Value

Austin Energy's Non-Demand VOS credit includes a component for avoided fixed costs related to O&M of the avoided combustion turbine theorized in the valuation of the generation capacity value. This same credit is not included in the Demand VOS credit.

Currently, Austin Energy is using the Fixed O&M Expense for an advanced combustion turbine assumed by the Energy Information Association's (EIA) 2016 Annual Energy Outlook, escalated to account for the year the report was published. EIA's most recent Annual Energy Outlook for 2021 reports that fixed O&M expense for a combustion turbine (industrial frame) is $7.04 per kW[3], which represents a $0.04 per kW difference from Austin Energy's escalation of the 2016 value.

[3] https://www.eia.gov/outlooks/aeo/assumptions/pdf/table_8.2.pdf

Memorandum

Given the above discussion on the generation capacity value component, we recommend that Austin Energy remove this component from its Non-Demand VOS credit calculation. If a forward-looking approach is retained, generation capacity-related avoided costs should be included in the "effective implied heat rate" mechanism discussed above.

Recommendations

- NewGen recommends that Austin Energy remove the plant O&M value component from its Non-Demand VOS credit calculation and, instead, either rely on the effective implied heat rate (if a forward-looking approach is continued) to account for this savings as is currently applied for the Demand VOS energy component or rely on historical market pricing if a backwards-looking approach is preferred. This will make the overall VOS credits more consistent and avoid duplication of benefits.

1.5 Transmission and Distribution Value

The Transmission and Distribution (T&D) value component of the VOS credit represents two distinct avoided costs: 1) avoided transmission expense owing to reduction in peak load due to delivery of energy from PV installations and 2) avoided capital investment costs to the distribution grid due to the local (i.e., nearby) generation from PV installations (netted against any increases in costs). Currently, Austin Energy does not calculate a credit for the distribution portion of the T&D value component. While it is common practice in the industry to value the cost savings from rooftop solar installations to transmission expense, it is less common to value avoided capital investment costs on the distribution system.

Impacts to the distribution system from customer-sited PV systems are specific to the local circuit where they exist. The presence of PV could potentially avoid/defer upgrade costs if the systems is installed on a distribution circuit that exceeds or is near its maximum capacity rating. However, the installation of PV on a circuit with low usage could lead to reverse energy flow and ultimately lead to additional maintenance and/or capital expenses for the distribution system. Thus, the presence of PV installations on the system can result in avoided distribution costs or increased distribution costs. Because Austin Energy does not dictate or encourage installation of PV based on the needs of its distribution system, it is difficult to determine if any incremental benefit or cost exists with the addition of customer-sited PV. Further, Austin Energy's distribution planning staff does not consider the presence or absence of PV when sizing distribution facilities (e.g., transformers). Therefore, we agree with Austin Energy's approach to assign no value (either positive or negative) for distribution impacts in its VOS credit.

Austin Energy incurs transmission expense based on its contribution to ERCOT's annual four summer coincident peaks (4CP) in the prior year. The actual expense incurred is Austin Energy's contribution to the ERCOT 4CP multiplied by the sum of the individual wholesale transmission service charges billed by each transmission service provider (informally referred to as the "ERCOT postage stamp rate"). For the VOS credit, the avoided transmission expense is the reduction in Austin Energy's contribution to the ERCOT 4CP due to energy produced at that time by PV installations multiplied by the ERCOT postage stamp rate. This reduction is a relatively straightforward method to estimate the value of PV, as it utilizes either the total installed PV capacity multiplied by Load Match at the time of the ERCOT 4CP or historical PV

production at the time of the ERCOT 4CP. Figure 3 compares characteristic summer daily generation profiles[4] against the hours when the ERCOT 4CP has occurred[5].

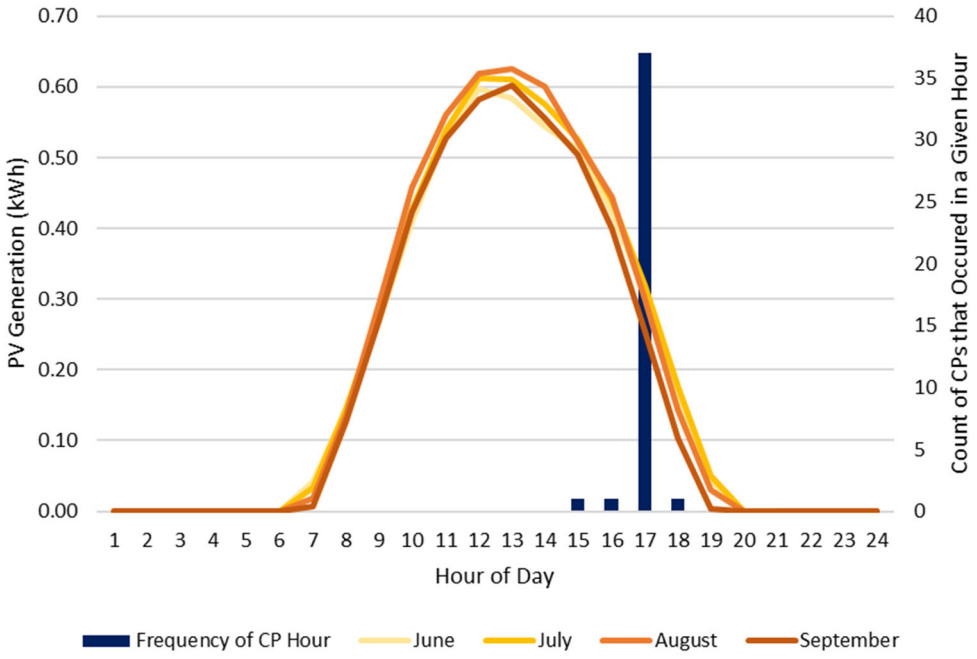

Figure 3: Comparison of Generation Profiles Against the Frequency of Occurrence of ERCOT CP Hours

As can be seen in Figure 3, the vast majority of ERCOT summer CPs occur at 5:00 PM when solar production is on the decline.

Presently, Austin Energy utilizes the same load matching value of 50% (intended to represent the rooftop solar generation in the peak hour of interest over the maximum customer PV generation for the year) when determining the generation capacity value and the T&D Value. However, based on Austin Energy's prior base rate reviews, generation demand costs are allocated using the ERCOT 12CP and, in ERCOT, the transmission costs are allocated using the ERCOT 4CP. Thus, there likely should be a difference in the Load Match used for the generation capacity value and the T&D value in the VOS calculations if the Load Match approach is to be used.

Because the transmission expense incurred by Austin Energy is determined from historic data, we recommend the use of either actual historic average load matching value times PV capacity or actual PV production at the time of the ERCOT 4CP for this calculation. This would better represent the reduction in transmission avoided costs related to PV production. Further, for consistency, the PV capacity should be determined based on historical actual maximum production, rather than nameplate capacity. Inconsistency between the sources of these inputs could result in erroneous results.

[4] Generation profiles provided by National Renewable Energy Laboratory PV Watts and assume a 1 kW fixed rooftop installation oriented at 180°

[5] Historic ERCOT 4CP hours from 2012 to 2021

Memorandum

Finally, Austin Energy has had a significant increase in PV penetration since 2012, when the VOS credit was first implemented. Owing to this long history, it may be possible for Austin Energy to investigate whether these transmission savings have been realized historically. To estimate this savings, Austin Energy could analyze the available interval data to determine the magnitude of customer-sited PV generation at each of ERCOT's 4CP hours and determine the actual historic reduction in peak load.

Recommendations

- Austin Energy should continue to assign zero value to its distribution component until it can clearly define a system benefit (or cost) associated with customer-sited PV systems.
- If Austin Energy is to continue to rely on its existing approach to transmission savings, it should modify the calculation of the avoided transmission expense to incorporate actual load matching factors determined for the hours of the prior year's ERCOT 4CPs, rather than rely on the current assumption of 50% for the transmission Load Match value. Further, the PV capacity should be determined based on actual maximum production, rather than nameplate capacity.
- In lieu of relying on Load Match (under the existing approach), Austin Energy could use actual PV production at the time of the ERCOT 4CP for this calculation.

1.6 Environmental Value

The final component in Austin Energy's formulation of the VOS credit is the environmental value component. Specifically, the VOS tariff language suggests that this value component is based on estimated avoided emissions and priced at the societal cost of carbon. Presently, this component does not appear to be cost-based (per the materials provided for our review) and is set at a flat rate of $0.015 per kWh. There was an indication in the materials provided that this value is meant to represent emissions avoided by PV system generation compared to Austin Energy's otherwise applicable resource portfolio. Currently, carbon emissions are not regulated in the ERCOT market and there is no market value for carbon allowances in Texas. Additionally, because of the increasing share of renewables in Austin Energy's resource portfolio over time, the relative emissions from its non-renewable resources have likely changed since the initial determination of the VOS credit component.

The definition of the component indicates that it is meant to represent avoided emissions costs to meet local environmental policy goals. This could apply to Austin Energy's renewable generation goals, as well as those developed by the state. The State of Texas has already surpassed the most recent renewable mandate from the Public Utility Commission of Texas (i.e., acquiring 10 GW of renewable capacity by 2025). However, as indicated previously, Austin Energy is still short of its 2030 Plan renewable energy goals, especially those associated with customer-sited generation. A cost-based method to increase Austin Energy's renewable energy portfolio could be to utilize forecasted values for Renewable Energy Credits (RECs) (i.e., the price to procure renewable attributes) as a proxy for this value component.

Austin Energy could also include an environmental value component to the VOS credit that is solely based on its policy objectives, rather than underlying cost avoidance. It should be clear, however, that providing this VOS credit component to PV customers represents a subsidy provided by non-PV customers. This distinction between a cost-based credit and a non-cost-based subsidy should be agreed upon by Austin Energy as a policy decision.

Recommendations

- Evaluate a cost basis for the environmental component of the VOS credit that aligns with Austin Energy's actual costs or those represented in the market (e.g., REC pricing).
- Determine if the environmental component of the VOS credit should be based solely on a policy objective to achieve specific goals for customer-sited PV capacity and, if so, provide transparency to policymakers regarding the subsidy provided by non-PV customers to PV customers.

1.7 Increased Costs Associated with PV

NewGen recognizes that Austin Energy incurs additional costs associated with customers that install PV systems. Beyond the solar rebates offered to qualifying residential customers and incentives programs for commercial customers, Austin Energy incurs additional costs for the second meter (to read production from the PV system), meter reading and data management, administration of the PV programs, marketing, and other overhead functions. For the purposes of this review, these costs are considered to be representative of the costs of having a PV program. Thus, we have not quantified this additional benefit to PV customers and have not included this element as an offset to the VOS credit.

Task 2: The State of the Industry for Solar Policy

California NEM Reform

The Net Energy Metering (NEM) construct allows PV customers to avoid paying for energy that is provided by the PV system (rather than the utility). Generally, under NEM, the avoided energy value is equal to the retail price of electricity for that customer. Since most retail energy rates include recovery of fixed costs, this means that PV customers are avoiding some fixed costs. To the extent that PV customers do not pay their share of fixed costs, this creates a subsidy provided by non-PV customers. Recently, several states and municipal electric utilities have initiated reform efforts for their NEM rates and associated customer-sited PV systems. These include efforts in California, Texas, and others. By far, the largest impact of these reforms in terms of potential number of customers impacted is in California. In December 2021, the California Public Utilities Commission (CPUC) issued its proposed decision for what has become known as its Net Billing Tariff (this is the third iteration of NEM reform in California). This includes several significant changes that impact future PV customers in the state, as well as existing PV customers over time.

The proposed CPUC Net Billing Tariff, if approved, will apply to the investor-owned utilities (IOUs) in the state, primarily Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E). However, the Net Billing Tariff will provide guidance for municipally-owned utilities in the state as they approach the regulatory threshold that will allow them to enact NEM rate reform. At a high level, the Net Billing Tariff is based on an avoided cost concept that sets an average monthly value for each hour, that includes components similar to Austin Energy's VOS. These include generation capacity, energy, transmission and distribution, as well as component for ancillary services, greenhouse gas (GHG) value, GHG emissions, and high global warming potential (GWP) gas emissions. The energy component is based on energy future pricing reflective in the California Independent System Operator (CAISO) market. Generation capacity is based on battery storage costs. The transmission and distribution components are based on marginal cost filings by the three largest investor-owned utilities in the state.

Memorandum

Ancillary services costs are defined as a percentage of energy costs. The collective environmental avoided costs are based on cap-and-trade pricing for GHG allowances, short-run marginal GHG emissions, and methane and refrigerant leakage modeling for GWP gasses.

One of the more contentious elements of the proposed Net Billing Tariff is a proposed non-bypassable Grid Participation Charge. This is proposed to be a fixed monthly charge based on the nameplate capacity (kW) of a residential customer's PV system. Non-residential customers already have fixed demand charges in their rate structures and will not be required to pay the Grid Participation Charge. The proposed Grid Participation Charge as adopted is $8.00/kW per month for all residential PV customers served by the IOUs in the state. This charge is intended to recover the fixed costs associated with serving PV customers that are not recovered elsewhere in the rates. The CPUC has developed a transition plan for existing customers that is designed to reduce the impact of the proposed changes in the Net Billing Tariff.

Obviously, there are several differences between the California and Texas electric utility markets. California has established aggressive renewable energy goals and requirements for all electric utilities and has fostered significant investments in distributed and utility-scale PV systems. Additionally, California has a strong regulatory structure and has established markets for RECs, emission allowances, and ancillary services. Austin Energy should consider certain elements of the proposed California Net Billing Tariff as they apply to its renewable energy policy goals and the ERCOT market, as appropriate.

California NEM Credits

As previously acknowledged, Texas is not California. Further, NEM programs are not the same as buy-all/sell-all programs. However, as a point of reference, Table 3 lists the credit and basis for NEM programs offered by publicly-owned utilities in California.

Memorandum

Review of Austin Energy's Value of Solar
Page 16

Table 3
Review of NEM Programs for Publicly-Owned California Electric Utilities

Utility	True-Up Period	TOU	Bidirectional	Remaining Credits Price $/kWh	Effective Date	Credit Type
Alameda	Monthly			$0.06968	12/31/2016	Avoided Cost
Anaheim	Monthly	x	x	=ACC rate *TOD factor	12/31/2020	Avoided Cost
Azusa	Yearly	x	x	$0.069	7/21/2021	Avoided Cost
Burbank	Yearly			$0.1600	7/1/2021	Retail Rate
Los Angeles	N/A			Retail Rate	9/1/2008	Retail Rate
Palo Alto	Monthly		x	$0.1078	1/1/2018	Retail Rate
Pasadena	Yearly	x		Avg. Energy	1/31/2020	Retail Rate
	Bimonthly	x		Avg. Energy + 0.066/kWh	1/31/2020	Retail Rate+
Redding	Monthly		x	$0.0608	1/1/2019	Avoided Cost
Sacramento	Yearly			$0.0562	1/1/2021	Avoided Cost
Silicon Valley Power	Yearly	x		$0.0396	2/1/2021	Avoided Cost
Modesto Irrigation District	Monthly			$0.076	7/1/2020	Avoided Cost
Turlock Irrigation District	Monthly	x	x	Monthly Marginal Cost	1/1/2015	Avoided Cost
Lodi	Monthly		x	$0.0687	9/1/2017	Avoided Cost
Imperial Irrigation District	Yearly	x	x	$0.0698	1/1/2015	Avoided Cost
Shasta Lake	Monthly		x	$0.0175	11/1/2020	Avoided Cost
Roseville	Monthly		x	$0.0598	10/1/2018	Avoided Cost

Pedernales Electric Cooperative

Pedernales Electric Cooperative (PEC) recently reformed its PV program. Although PEC referred to the analysis as a "value of solar" study, PEC's PV program is based on a NEM structure (rather than buy-all/sell-all). The stated goal of PEC was to minimize the subsidy between PV and non-PV customers to ensure an equitable and sustainable rate paid for excess generation sent back to the grid (termed "received energy"). This change was implemented so that as PV adoption increases "an untenable burden is not placed on non-solar members". Thus, the analysis that developed the credit paid on received energy (termed the "Sustainable Power Credit") was based on what PEC described as the "actual value" of PV. This included estimates of "actual cash savings to PEC" for avoided energy, ancillary services, and transmission costs. PEC indicated it does not incur any direct cash charges for environmental attributes and, thus, this is not considered in PEC's value of solar. As of March 1, 2022, the Sustainable Power Credit will be $0.05377 per kWh of received energy. PEC is using a three-year average of historical ERCOT market prices as the basis for the Sustainable Power Credit – presumably to reduce the variation from year to year while still reflecting recent market prices.

Memorandum

City of Georgetown, Texas

The City of Georgetown, Texas and the Georgetown Electric Utility (GEU) recently approved changes to its NEM program. This included a methodology to establish a market-based value for the received energy from the NEM customer's PV system (i.e., excess energy that is sent back to the utility grid during a given month) and a recognition of estimated transmission cost savings. Recent updates to the GEU's methodology included utilizing Locational Marginal Pricing data from ERCOT and excluding certain periods for which ERCOT and/or the Public Utility Commission of Texas identifies as emergencies and/or controlled outages for calculating the market-based value. Additional detail on programmatic changes to GEU's NEM program can be provided upon request.

NewGen Strategies & Solutions
8140 North Mopac Expressway
Suite 1-240
Austin, TX 78759
Phone: (512) 806-7713

Memorandum

To: Austin Energy

From: NewGen Strategies & Solutions

Date: April 5, 2022

Re: Avoided Cost Based Component of the Value of Solar Credit

Introduction

Austin Energy retained NewGen Strategies & Solutions (NewGen) to calculate an avoided cost based component of the updated Value of Solar (VOS) credit paid to customers with qualifying solar generation (i.e., photo voltaic (PV) systems) for all energy produced by the PV systems. It is envisioned that the avoided cost based component of the overall VOS credit paid to PV customers will be recovered by Austin Energy through the Power Supply Adjustment (PSA) pass-through charge.

Formulas

The avoided cost based component of the VOS credit is composed of the following three elements:

1) ERCOT Energy Savings – This element is based on the weighted average price for energy at the time of PV generation and is calculated as the sum of the Austin Energy Node (AEN) day-ahead price for each hour in the year multiplied by the PV generation for that same hour divided by the total PV generation, as shown in the formula below.

$$\text{ERCOT Energy Savings} = \frac{\sum (\text{AEN Price}) * (\text{Hourly PV Generation})}{(\text{Total Annual PV Generation})}$$

2) Transmission Savings – This element is based on average PV generation at the ERCOT 4CP[1] multiplied by the ERCOT postage stamp rate[2] divided by the total PV generation, as shown in the formula below.

$$\text{Transmission Savings} = \frac{(\text{Average PV Generation at ERCOT 4CP}) * (\text{Postage Stamp Rate})}{(\text{Total Annual PV Generation})}$$

[1] The ERCOT 4CP is the coincidental peak demand in the ERCOT market in June, July, August, and September of each year. This typically occurs around 5:00 PM in each of these months.
[2] The "postage stamp rate" refers to the sum of the individual wholesale transmission service charges billed by each transmission service provider in ERCOT.

Memorandum

3) Ancillary Service Savings – This element is based on the weighted average price for ancillary services (AS) at the time of PV generation. ERCOT has four ancillary service products currently that support the transmission of energy to loads and the reliable operation of the bulk electric system. These four products are Regulation Service – Up (REG UP), Regulation Service – Down (REG DOWN), Responsive Reserve Service (RRS), and Non-spinning Reserve Service (NSRS). The Ancillary Service Savings is calculated as the sum of the Scaled AS Price for each hour in the year multiplied by the PV generation for that same hour divided by the total PV generation, as shown in the formula below.

$$\text{Ancillary Service Savings} = \frac{\sum (\text{Scaled AS Price}) * (\text{Hourly PV Generation})}{(\text{Total Annual PV Generation})}$$

Where, the Scaled AS Price is the sum of the four different ancillary service products in each hour scaled to its relevant proportion with overall ERCOT energy load.[3]

Key Notes:

Each of the three elements are appropriately adjusted for estimated line losses. Austin Energy currently estimates line losses to be 4.39% for the system overall and 5.14% for secondary voltage customers. Given virtually all PV customers are served at secondary voltage, 5.14% has been utilized for these calculations. As with the current VOS credit, the Transmission Savings element would not be applicable to PV systems with a capacity ≥ 1,000 kW.

The AEN Price is based on the day-ahead wholesale energy prices obtained from ERCOT. ERCOT also supplies the ancillary service prices and volumes as well as the times for the ERCOT coincident peaks. The ERCOT postage stamp rate is obtained from the relevant Public Utility Commission of Texas docket.

Calculation

Since Austin Energy is currently intending to update the avoided cost based component of the VOS credit annually, NewGen developed a calculation of the avoided cost based component for fiscal year (FY) 2021 (and FY 2020 for comparison). For this analysis, NewGen has excluded ERCOT market pricing from certain atypical market events.[4] NewGen views the exclusion of atypical market events as appropriate given their likely non-recurring nature and concern over the reliability of load data given the requirements for controlled outages by ERCOT. NewGen does not believe the sample data, which is reasonably accurate

[3] For example, if overall ERCOT energy load in an hour was 40,000 MW and ERCOT procured 350 MW of REG UP in that hour, then the scaled amount applied to the price for REG UP would be approximately 0.875% (indicating that ERCOT procured approximately 875 kW of REG UP, on average, for every 100,000 kW of load in that hour).
[4] NewGen excluded certain periods which ERCOT and/or the Public Utilities Commission of Texas identify as emergencies and/or controlled outage from calculation of the ERCOT Energy Savings, which removed 240 hours (February 10 – 19, inclusive) from inclusion in 2021. The Ancillary Service Savings excluded February 10 – 22, inclusive.

Memorandum

under normal conditions, was developed to be predictive during an emergency event. Including such outlier events could cause the calculation to be unduly volatile and may not represent the actual avoided costs. Further, given the direction from ERCOT for controlled outages to protect the entire grid from voltage collapse, NewGen believes that Austin Energy's overall priorities are modified from their otherwise typical obligation to serve customer load.

Based on the appropriately weighted sample to represent the population of PV customers, NewGen calculated the avoided cost based elements shown in Table 1 for FY 2021 (and FY 2020 for comparison).

Table 1
Avoided Cost Based Component of the Value of Solar Credit

Elements	FY 2020		FY 2021	
	PV systems < 1,000 kW	PV systems ≥ 1,000 kW	PV systems < 1,000 kW	PV systems ≥ 1,000 kW
ERCOT Energy Savings	$ 0.0367	$ 0.0367	$ 0.0467	$ 0.0467
Transmission Savings	$ 0.0250	$ -	$ 0.0267	$ -
Ancillary Service Savings	$ 0.0015	$ 0.0015	$ 0.0027	$ 0.0027
Total ($/kWh)	**$ 0.0632**	**$ 0.0382**	**$ 0.0761**	**$ 0.0494**

Note: values have been adjusted for line losses