

MEMORANDUM

TO: UTILITIES ADVISORY COMMISSION

FROM: UTILITIES DEPARTMENT

DATE: April 12, 2016

SUBJECT: **Staff Request that the Utilities Advisory Commission Recommend that City Council Approve the Proposed Net Energy Metering Successor Rate E-EEC-1 and Net Energy Metering Grandfathering Policy**

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REQUEST

Staff requests that the Utilities Advisory Commission (UAC) recommend that the City Council adopt:

1. The proposed net energy metering (NEM) successor rate structure E-EEC-1 (Attachment A); and
2. The following grandfathering provisions for eligible NEM customers:
 - a. Establish a 20-year transition period from the time of system interconnection through which NEM customers will remain eligible for net metering and related terms and conditions described in California Public Utilities Code Section 2827, and
 - b. Allow NEM customers to expand their systems by up to 10% of the original system size while still remaining eligible for net metering after the NEM cap has been reached.

EXECUTIVE SUMMARY

Net energy metering (NEM) is a billing mechanism designed to promote the installation of renewable distributed generation by allowing customers to be compensated at the full retail rate for electricity generated by their on-site systems, such as solar photovoltaic (solar PV) systems. Under the City's current rates, NEM customers can reduce, or completely avoid, charges on their electric utility bill while still remaining interconnected with the electric grid and utilizing grid services. State law requires all electric utilities to offer NEM to customers with eligible renewable distributed generation up to a maximum cap, or "NEM cap", which in Palo Alto is 9.5 megawatts (MW). The set of terms and conditions for on-site renewable generation installed after the NEM cap is reached is referred to as the "NEM successor rate" or "NEM successor program." As of mid-February, the City of Palo Alto Utilities (CPAU) was approximately 79% toward meeting the NEM cap, and could exceed it by the end of 2016.

As Utilities across the state approach their respective NEM caps, NEM successor rates are a topic of much debate. To help guide staff efforts on the NEM successor rate development, City Council adopted NEM Successor Program Design Guidelines in January 2016.

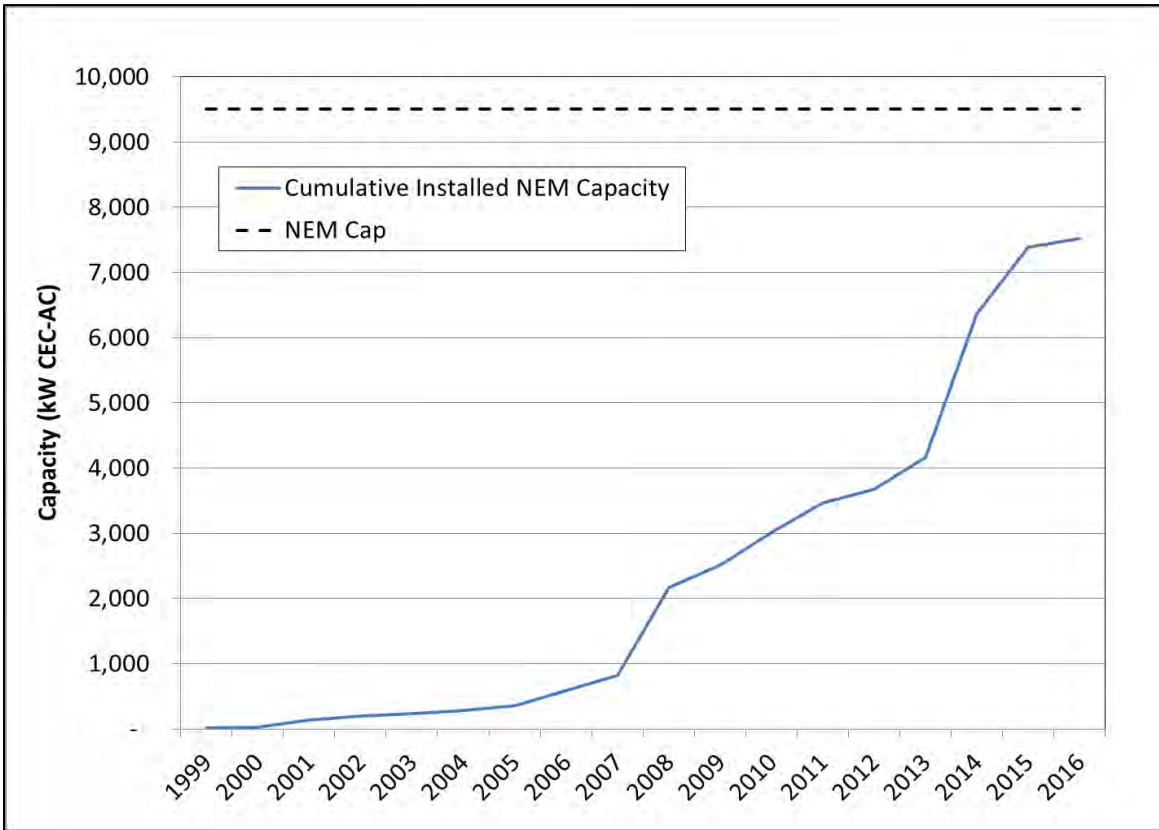
Under the proposed NEM successor rate, customers would receive a credit for all electricity sent to the grid (when instantaneous on-site generation is greater than instantaneous on-site consumption), and they would be billed at the prevailing retail rate for all electricity drawn from the grid (when instantaneous on-site consumption is greater than instantaneous on-site generation). The proposed value of the credit for energy sent to the grid is 7.485 cents per kilowatt-hour (kWh), which compensates the customer for the energy, avoided capacity charges, avoided transmission/ancillary service charges, avoided transmission and distribution system losses, and environmental attributes. The energy value takes into account that solar energy is often generated at times of the state's peak system demand. If approved, the credit would take effect July 1, 2016, and would be updated annually along with the budget. Based on staff analysis, the proposal will support continued solar PV deployment while ensuring that the City's electric rates are based on the cost of providing service, in compliance with state constitutional requirements amended by Proposition 26.

In addition to the proposed NEM successor rate, staff also recommends adopting a grandfathering policy for customers with systems installed within the NEM cap. Specifically, staff proposes adopting a 20-year transition period from the time of interconnection through which NEM customers remain eligible for net metering under the terms set forth in California Public Utilities Code 2827. In addition, staff proposes allowing grandfathered customers to expand their systems by up to 10% of the original system size while still remaining eligible for net metering after the NEM cap has been reached.

BACKGROUND

Net energy metering was established in California in 1996 as a mechanism to support distributed energy generation such as solar PV (sometimes referred to as "customer-sited" or "behind-the-meter" generation). In 1999, Palo Alto began a solar PV demonstration program, through which the first net metered systems were installed in the City. At the time, the total system price was over \$10 per watt. Solar PV system costs have dropped by 70% compared to the late 1990s.

Figure 1: Summary of NEM Participation (1999 through mid-February 2016)



The California Public Utilities Code section on NEM requires all electric utilities to offer NEM to eligible customers with renewable distributed generation, up to a cap. In October 2015 Council formally adopted a NEM cap for Palo Alto of 9.5 MW ([Staff Report 6139](#)). As of mid-February 2016, the City is approximately 79% toward meeting its NEM cap, as shown in Figure 1. To date, all local solar PV installations in Palo Alto utilize NEM, and all net energy metered systems are solar PV systems.

All NEM customers are subject to terms and conditions outlined in the California Public Utilities Code Section 2827, including the ability to receive credit for eligible on-site customer generation at the retail rate, to have the credits roll over month-to-month over a 12-month period, and the option to cash-out any net surplus generation that exists at the end of the 12-month period. NEM customers remain subject to Council-approved changes to their otherwise applicable electric rate schedules, including rate design changes and potential minimum or fixed charges.

Assembly Bill 327 (AB 327) directed the California Public Utilities Commission (CPUC) to develop a standard NEM successor tariff for the state's investor-owned utilities (IOUs) no later than December 31, 2015¹. For the IOUs, the NEM successor tariff is to take effect either after an IOU has reached its NEM cap or July 1, 2017, whichever occurs first. On January 28, 2016, in a split

¹ http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB327

3-2 decision, the CPUC approved a NEM successor tariff for IOUs that leaves NEM largely intact. The primary differences from the original NEM structure are that customers under the NEM successor rate are required 1) to pay an interconnection fee estimated to be \$75-\$150, 2) to be subject to certain non-bypassable charges on all energy delivered to the customer by the utility estimated to be 2-3 cents per kWh, and 3) to take service under a time-of-use rate if interconnecting from January 1, 2018, onward. The CPUC decision also establishes a 2019 review of the NEM successor tariff.

Publicly-owned utilities (POUs) in California, whose rates are not regulated by the CPUC, are working with their respective governing bodies and stakeholders to formulate their own NEM successor rates, to take effect after their respective NEM caps have been reached. To staff's knowledge, only two California POUs have adopted NEM successor rates: the City of Lompoc and Turlock Irrigation District (TID). In contrast to the CPUC-adopted NEM successor tariff for the IOUs, the POU-adopted NEM successor rates significantly modify the existing NEM program. More detailed information of the adopted NEM successor rates at California POUs is included in the Discussion section below.

Local Solar Plan

On April 22, 2014, the City Council adopted the Local Solar Plan ([Staff Report 4608](#), [Resolution 9402](#)), which set the overarching goal of meeting 4% of the City's total energy needs from local solar by 2023, corresponding to achieving 23 MW of solar PV installed in the City. Included within the Local Solar Plan is a strategy to develop proper policies, incentives, price signals and rates to encourage solar installation, including the exploration of cost-based rate structures that encourage the development of new solar systems in Palo Alto.

Electric Cost of Service Analysis (COSA)

CPAU carried out an electric cost of service analysis (COSA) in Winter 2015/2016. The primary goal of the COSA was to review the allocation of costs to customer classes and the electric rate design to ensure customers are charged according to the cost to serve them. The COSA also included a review of the rate design issues created by increasing numbers of local solar installations and the impact of rate designs on the economics of local solar for current and future customers. The NEM successor rate development was carried out in close coordination with the electric COSA. The proposed electric rate adjustments to be effective July 1, 2016 are described in the FY 2017 Financial Plan which is presented in an April 2016 UAC report.

NEM Successor Program Design Guidelines & Stakeholder Feedback

In order to guide research and development efforts, staff developed a set of design guidelines for the NEM successor rate, called the "NEM Successor Program Design Guidelines". After receiving recommendations from the UAC and the Finance Committee, City Council formally adopted the NEM Successor Program Design Guidelines in January 2016 ([Staff Report 6437](#)).

Through the stakeholder review process of the design guidelines, CPAU also received extensive feedback from the solar industry and advocates. The Energy Freedom Coalition of America (EFCA), a SolarCity-funded national advocacy group promoting public awareness and the

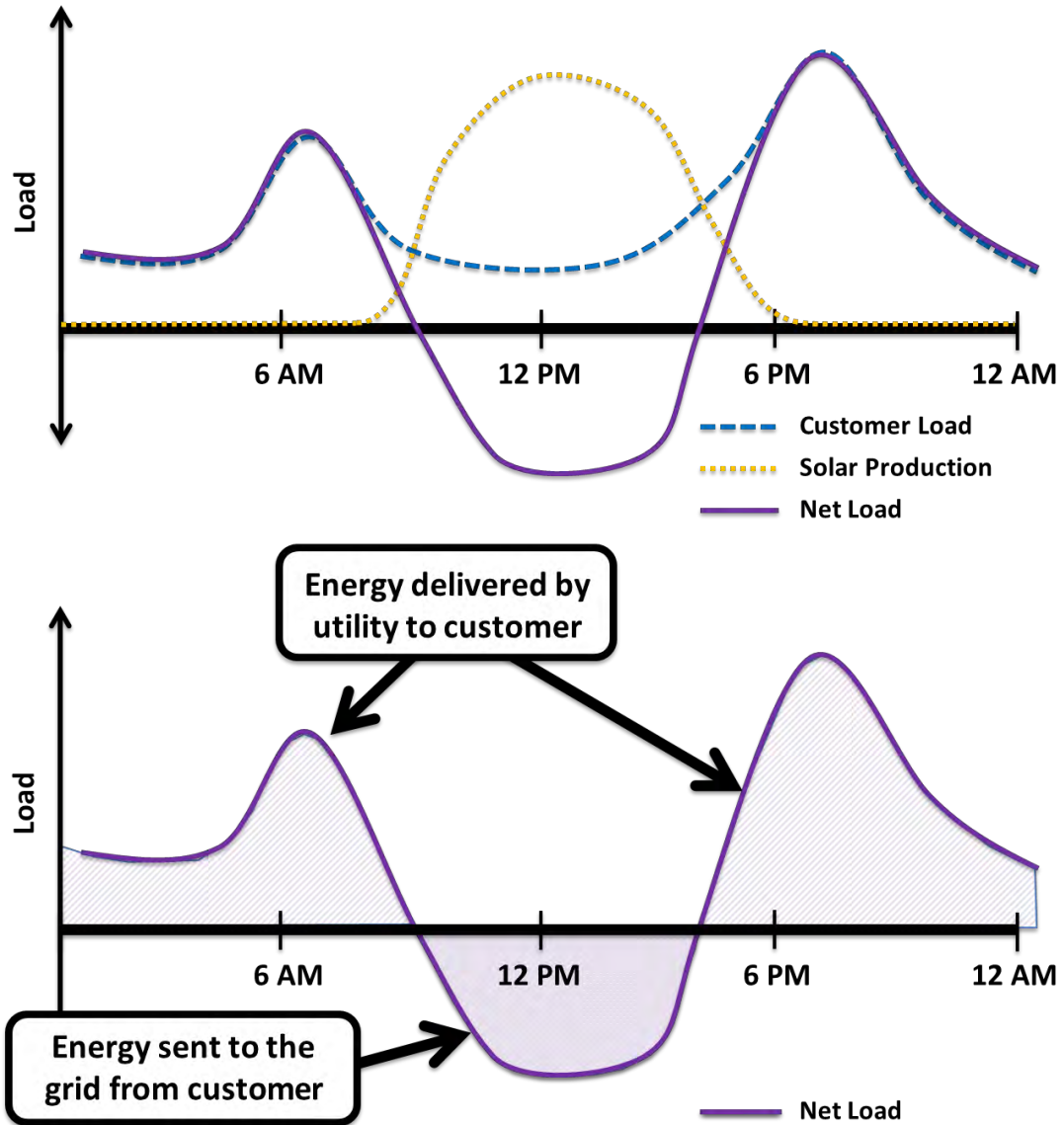
benefits of solar and alternative energy, provided extensive feedback on NEM and the proposed design guidelines in letters to the UAC, Finance Committee, and City Council preceding each step of the review process. The letter EFCA submitted to City Council is included as Attachment D.

DISCUSSION

Energy Flows in a Typical Residential PV System

When a customer installs a solar PV system, the energy produced by the system first serves the customer load and is netted on-site. When the customer's energy demand is greater than what is being generated by the solar system at that point in time, then the customer draws additional power from the grid to meet their energy needs. When the customer is using less energy than the solar PV system is generating, the excess energy is exported to the grid. This energy is referred to by a variety of terms including "energy sent to the grid," "energy exports," "surplus energy," and "excess energy." Figure 2 is an illustration of a daily load of a residential customer with a solar PV system that specifies the energy sent to the grid and the energy delivered by the utility.

Figure 2:
(Top) Illustration of a residential solar customer's load, solar production, and net load
(Bottom) Illustration of the energy that is delivered by the utility to the customer and the energy that is sent to the grid



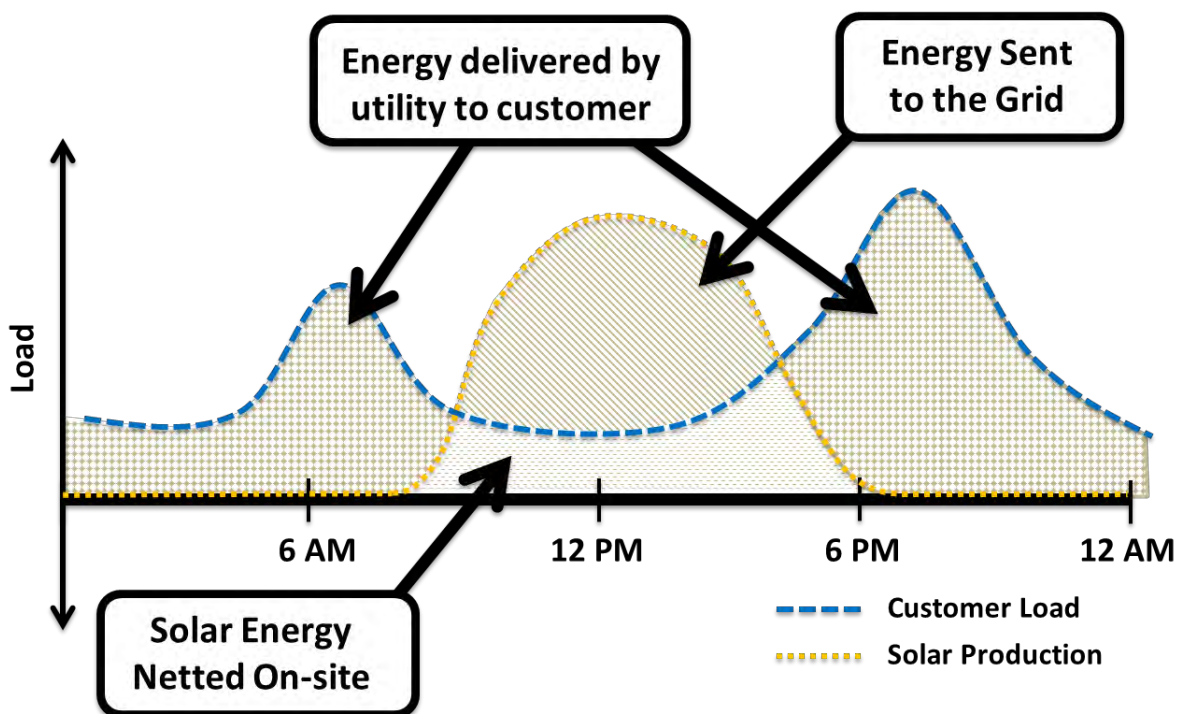
NEM Successor Proposal

Staff carried out a thorough evaluation of a broad variety of NEM successor rate design options considering the NEM successor design guidelines as well as conceptual and practical considerations of each option. Under the proposed NEM successor rate, customers would receive a credit for all electricity sent to the grid (energy generated in excess of instantaneous usage), and they would be billed at the prevailing retail rate for all electricity they use from the grid (energy used in excess of instantaneous generation). Large commercial customers, or customers with small PV systems relative to their overall load, may rarely or potentially never export energy to the grid. Residential customers, or customers with systems sized to meet a

large fraction of their load, typically export energy on a daily basis during hours of peak solar production.

Figure 3 shows all three categories of energy, including the solar energy netted on-site (solar generation used directly on-site).

Figure 3: Illustration of three categories of energy: solar energy netted on-site, energy sent to the grid, and energy delivered by the utility to the customer

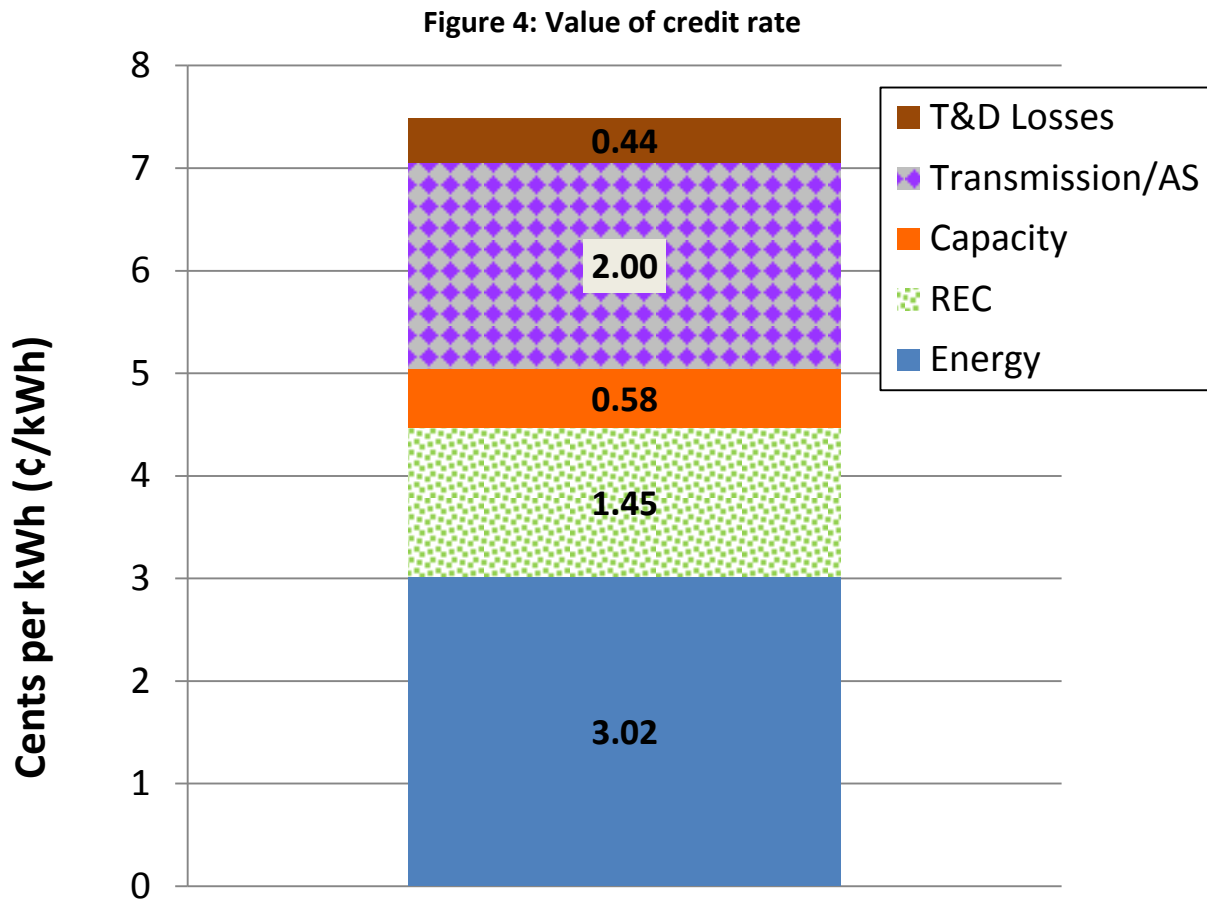


Under the staff proposal, over the course of a billing period, the sum of all energy delivered by the utility to the customer would be charged at the prevailing retail rate. For example, if the solar customer is a residential customer, the energy delivered by the utility in the billing period would be subject to the E-1 rate. In addition to the utility charges, the customer would also be credited for all energy sent to the grid. The sum of all energy exports would be credited at the credit rate of 7.485 cents per kWh. If in a given billing period, the total credits applied to the customer's utility bill for exported energy exceed the total charges applied for the energy delivered to the customer, the surplus credit will automatically apply to the customer's bill. Please see Attachment C for an illustration of an example bill for a residential customer who installs a solar system subject to the proposed NEM successor rate.

Value of the Credit Rate

The value of the credit for energy sent to the grid is 7.485 cents per kWh. As shown in Figure 4, this value compensates the customer for the energy, avoided capacity charges, avoided transmission and ancillary service (AS) charges, avoided transmission and distribution (T&D) system losses, and renewable energy credits (RECs), or environmental attributes. The energy

component to the overall credit rate is calculated by taking wholesale monthly round-the-clock market price indicatives for northern California, and weighting them based on the typical generation profile of rooftop solar PV systems in Palo Alto and the hourly profile of market prices in northern California. In this way, the valuation methodology accounts for the fact that solar energy is often generated at times of peak system demand. Avoided transmission and AS charges are calculated based on the actual charges that the City pays to the California Independent System Operator (CAISO) for these services. And, the value of the environmental benefits is based on market price indicatives for the value of a “Bucket 1” REC. The 7.485 cents per kWh credit would take effect July 1, 2016, and would be updated annually and approved along with the budget.



Metering

The proposed NEM successor rate structure requires a bidirectional meter. A bidirectional meter is a meter with two registers to measure energy flowing in each direction: the first register measures all energy drawn from the grid, while the second register measures all energy sent to the grid. For example, if a customer has a solar system and that system is generating energy that exceeds the instantaneous needs of the customer, energy is sent to the grid and measured on the second register of the bidirectional meter. For all other times when the energy generated by the solar system is not sufficient to meet the customer’s needs, then

energy is drawn from the grid and measured on the primary register. Under the proposed NEM successor rate structure, at the end of the billing period, the sum of the energy drawn from the grid measured on the primary register is billed at the applicable retail rate. The sum of the energy sent back to the grid measured on the second register is credited to the customer's account according to the credit rate. The usage that is directly served with simultaneous solar generation, the "solar energy netted on-site" shown in Figure 3, is not measured by the meter and, therefore, effectively avoids the full bundled retail rate.

At present, the default meter type is a single-register meter. Therefore, a bidirectional meter must be installed at a customer premise upon the installation of a solar PV system to implement the proposed NEM successor rate. These meters would be provided at no cost to the customer as part of CPAU's long-term meter replacement plan.

Environmental Attributes

As described above, the credit rate for energy sent to the grid is calculated based on the value of the energy, avoided capacity costs, avoided transmission and ancillary services costs, avoided transmission and distribution system losses, and environmental attributes, or RECs. Thus, all of the exported energy and its environmental benefits would be bought by CPAU as a bundled product. Under this proposal, the customer therefore could not claim the environmental benefits of any of the energy that is sent to the grid. However, the customer would nonetheless still be able to claim they are "going solar" for all of the energy that is netted on-site, as shown in Figure 3. An alternative is for CPAU to value the energy sent to the grid at a rate that does not include the environmental benefits—effectively stripping the REC from the energy—and paying the customer only for "brown" energy, so that customers can claim the environmental attributes for all energy produced from their systems. The staff proposal is to set the credit rate for exports to include the value of the environmental attributes because it improves the customer economics, and the customer would still be able to claim the RECs for all energy netted on-site.

Interconnection Fees

Public Utilities Code Section 2827 prohibits electric utilities from charging existing eligible customer generators for interconnection costs incurred by the utility. For systems installed after the NEM cap is reached, customers will be subject to an interconnection charge set at the level to recover the utility's cost of connecting them to the local distribution system. Staff is currently updating Utility Rate Schedule E-15 "Electric Service Connection Fees"², which contain charges for generation interconnection. The current estimate for the interconnection fee that would apply to a NEM successor customer is a one-time charge of between \$100-200. Staff plans to take Schedule E-15 forward for Council review in Fall 2016.

Addressing the NEM Successor Program Design Guidelines in Relation to the Staff Proposal

The development of the proposed NEM successor rate and potential alternatives was the result of a comprehensive evaluation guided by the Council-adopted design guidelines and the

² The current version can be found here: <http://www.cityofpaloalto.org/civicax/filebank/documents/8083>.

stakeholder feedback received through that process. Attachment B discusses each of the design guidelines in relation to the staff NEM successor program proposal.

Comparison to NEM Successor Rates Adopted in California and Across the Country

Table 1 provides a high-level summary of the NEM successor rates that have been adopted in California and other states across the country. The most relevant comparison agencies to CPAU are the listed California POU's.

Table 1: High-level Summary of Adopted NEM Successor Rates

Utility/Regulatory Body	Description of Adopted NEM Successor Rate	Decision Date
<i>CPAU*, Staff Proposal</i>	<i>All energy delivered by the utility charged at applicable retail rate, and all energy sent to the grid credited at short-term avoided cost export rate.</i>	<i>Under review</i>
Turlock Irrigation District*	Mandatory time-of-use rate that incorporates time-dependent demand and energy charges and standard fixed customer charge.	Dec. 2014
City of Lompoc*	Reverted to self-generation rate developed in the 1990s, which charges customers for distribution system costs for all energy generated and consumed on-site. Energy delivered to the customer charged at the applicable retail rate. All energy sent to the grid credited to customer at a wholesale rate.	June 2014
Hawaiian PUC	All energy delivered by the utility to the customer charged at applicable retail rate with a minimum monthly bill of \$25, and all energy sent to the grid credited at a fixed, island-dependent export rate. Customer forfeits any surplus credit at the end of a monthly billing cycle. HPUC also approved another rate option that is available exclusively to customers with solar plus storage systems that do not export to the grid.	Oct. 2015
California PUC	Continuation of full retail rate compensation. NEM successor customers subject to interconnection charges (est. \$75-\$150) and certain non-bypassable charges on all energy delivered to the customer (est. 2-3 ¢/kWh). Mandatory time-of-use rate in 2018. Planned NEM successor tariff review in 2019.	Jan. 2016
Nevada PUC	All energy delivered by the utility charged at applicable retail rate, and all energy sent to the grid credited at a fixed energy rate.	Feb. 2016
Modesto Irrigation District*	TBD	Planned: March 2016

* Subject to Proposition 26

Implications of Proposal on Solar Adoption in Palo Alto

Staff's analysis indicates that the proposed NEM successor rate will continue to promote solar adoption due to the following factors: the proposed NEM successor rate continues retail rate compensation for a significant fraction of the energy generated, solar PV system costs continue to decline year-over-year, the federal investment tax credit for 30% of the total system costs was extended until 2020, and customers can load-shift to enhance the economics of their on-site system if desired. Under this NEM successor proposal, staff expects to still achieve the Council-adopted Local Solar Plan goal of achieving 4% of the City's energy needs from local solar by 2023.

Customer Economics

The customer economics of a solar PV system adopted under the proposed NEM successor rate are dependent on a number of factors including: 1) the fraction of energy exported to the grid versus used immediately on-site, 2) the total solar PV system costs, 3) available federal incentives, and 4) other tax implications. Each of these factors is discussed in greater detail below.

1. Fraction of energy exported to the grid vs. used on-site

Customers that rarely export energy to the grid would have similar customer economics to systems installed within the NEM cap. On the other hand, if the fraction of energy sent to the grid is significant, it may impact the customer economics. Based on an analysis of CPAU's NEM solar customers, existing large commercial customers with solar systems rarely export. Therefore, the staff proposal is effectively a continuation of NEM. Given CPAU lacks full advanced meter deployment, residential solar customer data is more limited. The 2013 CPUC-commissioned study of NEM in the IOU service territories indicated that on average 49% of energy from residential systems is exported to the grid from their NEM customers³. Given the higher export fraction for residential customers based on typical load patterns, other economic factors discussed below may become more significant. Furthermore, under the proposed NEM successor rate, customers may decide to load-shift to consume energy concurrently with the solar generation, for instance by installing a behind-the-meter storage system or utilizing programmable or controllable loads. Load-shifting could reduce the fraction of energy exported to the grid and therefore increase the economic return of their solar system.

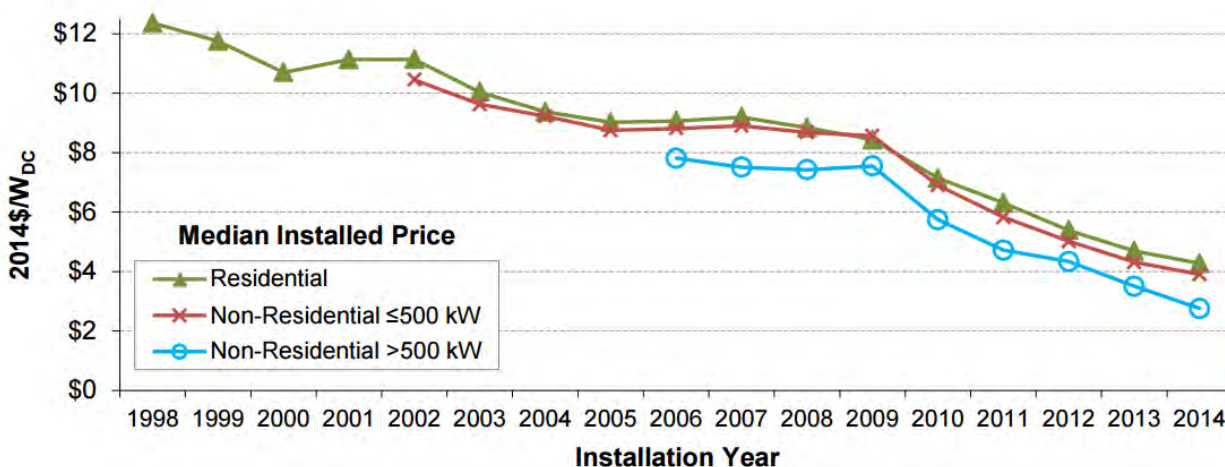
2. Solar PV system costs

As shown in Figure 5, the total solar PV system price has declined substantially in the past decades. As discussed in the report referenced in the figure caption, in the early years, the system price decline is attributed primarily to falling solar PV module costs. Since 2012, given the relatively constant price of solar modules, the recent declines are due to reductions in other total system cost components, including, system design, installation, permitting, interconnection, and marketing and customer acquisition. Industry experts indicate there is

³ *Draft Net Energy Metering Cost-Effectiveness Evaluation*, E3 (2013). (See https://ethree.com/documents/CSI/CPUC_NEM_Draft_Report_9-26-13.pdf accessed February 26, 2016)

opportunity for further cost reductions and forecast continued price declines in the coming three to five years.

Figure 5: Installed prices for residential and non-residential solar systems in the U.S.⁴



3. Federal incentives for solar

Significant federal incentives remain available for both commercial and residential projects. In mid-December 2015, the federal investment tax credit (ITC), which was set to drop from 30% to 10% for commercial systems and to 0% for residential systems at the end of 2016, was extended at the full 30% through the end of 2019, and will be phased downward year-by-year to 10% for commercial projects and 0% for household-owned residential projects in 2022. Commercially-owned projects also receive accelerated depreciation treatment, which, when combined with the 30% ITC, is estimated to make up over 40% of the total system costs⁵.

4. Other tax implications

In addition to the ITC, the tax implications for customer-cited generation installed under the NEM successor rate structure may differ from a system installed within the NEM cap, and may therefore impact the customer economics. Any solar customer under the NEM successor rate who within a given calendar year receives over \$600 in payments from CPAU for energy sent to the grid will receive a 1099 tax form. This is equivalent to how CPAU handles compensation paid to customers who elect to cash out their net surplus electricity after a 12-month period. Customers are encouraged to consult their tax advisor or legal counsel regarding tax implications for any distributed energy system, including those installed within the NEM cap or after the NEM cap has been reached.

⁴ Source of Figure 5 is *Tracking the Sun*, an annual solar PV cost tracking report produced by the Department of Energy’s Lawrence Berkeley National Laboratory. (See <http://newscenter.lbl.gov/2015/08/12/solar-prices-fell-2015/> accessed February 26, 2016)

⁵ *Private Net Benefits of Residential Solar PV: The Role of Electricity Tariffs, Tax Incentives and Rebates*, S. Borenstein (2015). (See <https://ei.haas.berkeley.edu/research/papers/WP259.pdf> accessed February 29, 2016)

Proposed Grandfathering Policy for Customers within the NEM Cap

Transition Period

In March 2014, the CPUC ruled that for the IOUs, existing NEM customers and all those who install eligible systems within each IOU’s respective NEM cap are eligible for full retail rate compensation through a 20-year transition period from the date of interconnection. The length of the transition period was determined in part based on an assessment of expected useful life, as indicated by module warranties, power purchase agreements, and third-party financing agreements. To staff’s knowledge, no California POU has adopted a specified time frame that NEM customers remain eligible for NEM. To help promote regulatory certainty and transparency for existing NEM customers who have invested in solar PV systems and for solar developers operating in Palo Alto, staff proposes that existing NEM customers and all eligible customers within the NEM cap in CPAU service territory remain eligible for NEM through a 20-year transition period from the date of system interconnection, matching the transition period adopted by the CPUC for the IOUs.

System Expansions

Some customers who install systems within the NEM cap may wish to expand their systems after the NEM cap has been reached. The circumstances under which the system could be expanded and remain eligible for NEM is covered by the NEM grandfathering policy. Staff proposes that if the existing NEM system is modified or repaired after the NEM cap is reached, the customer will remain eligible for NEM as long as the system does not increase by more than 10% of the original system size. If the system modification or expansion results in an increase of over 10% of the original system size, the customer would be required to transition to the NEM successor program for the entire system capacity. Allowing system expansion up to a given threshold is broadly in-line with system expansion policies established in the California IOU service territories and Turlock Irrigation District, as shown in Table 2. Adopting this policy would allow a customer to expand their system by a few panels or to replace panels that failed prematurely with higher efficiency panels while still remaining eligible for NEM under the original program terms.

Table 2: Existing policies of California utilities for system expansions after the NEM cap has been reached.

Utility	Description of System Expansion Policy
<i>CPAU, Staff Proposal</i>	<i>Customers remain eligible for NEM for system expansions within 10% of the original system size. Larger system expansions require the entire system capacity to be transitioned to the NEM successor rate.</i>
Turlock Irrigation District	Residential customers whose original system size is less than 10 kW may increase their system up to 11 kW total. Residential customers with an original system size of 10 kW or greater and non-residential customers may increase their system by a maximum of 10%. For expansions beyond these thresholds, the customer must transition the entire system capacity to the NEM successor rate.
City of Lompoc	No existing policy for system expansions.
Pacific	Customers may increase the system size up to 10% of the original system size or 1

Utility	Description of System Expansion Policy
Gas & Electric	kW, whichever is greater, and remain eligible for NEM. Customers who wish to expand their systems more may either 1) Meter the added capacity separately under the NEM successor tariff, or 2) elect for the entire system to take service under the NEM successor tariff.
San Diego Gas & Electric	Customers may increase the system size up to 10% of the original system size and remain eligible for NEM. Customers who wish to expand their systems beyond 10% may either 1) meter the added capacity separately under the NEM successor tariff, or 2) elect for the entire system to take service under the NEM successor tariff.
Southern California Edison	Customers may increase the system size up to 10% of the original system size or 1 kW, whichever is greater, and remain eligible for NEM. Customers who wish to expand their systems more may either 1) Meter the added capacity separately under the NEM successor tariff, or 2) elect for the entire system to take service under the NEM successor tariff.

NEXT STEPS

The tentative timeline for the review and approval of NEM-related policies and rates is shown below.

Tentative Timeline for Review and Approval of NEM-Related Policies and Rates

Description	UAC	Finance Committee	Council
Proposed NEM Successor Rate and Grandfathering Policy	April 2016	May 2016	June 2016
Update to Net Metering Net Surplus Electricity Compensation Rate (E-NSE-1)	June 2016	--	July 2016

RESOURCE IMPACT

Staff has developed an implementation plan to be executed upon adoption of the NEM successor rate to help ensure that CPAU will be ready for customers who install eligible renewable energy systems after the NEM cap has been reached. Implementation of the proposed NEM successor rate requires modifications to current business systems and processes including installing bidirectional electric meters, programming of meter reading devices, training meter reading staff, modifying the format of electric Utilities bills, and revising electric usage billing calculations. Furthermore, all staff must be trained in these new systems and processes. At present, all modifications to systems and processes are planned to utilize existing staff and budget resources.

The proposed NEM successor rate is based on the cost to serve, and the credit value would be updated annually to reflect the market value of solar energy, value of the RECs, avoided capacity charges, avoided charges for transmission and ancillary services, and avoided transmission and distribution system losses. Therefore, there would be no direct financial resource impact for eligible systems installed under staff’s proposed NEM successor program.

POLICY IMPACT

Fulfilling Palo Alto’s NEM legislative requirements and adopting the proposed NEM successor program are consistent with the California Public Utilities Code and state constitutional requirements regarding cost-based rates. Furthermore, adopting a NEM successor rate will add greater market certainty for those interested in installing rooftop solar PV after the NEM cap has been reached. The proposed policy directly supports Strategy #2 of the Local Solar Plan, to “develop proper policies, incentives, price signals and rates to encourage solar installation”. Furthermore, staff analyses indicates the proposed NEM successor rate will support continued uptake of distributed renewable energy technologies in Palo Alto, which further supports the Carbon Neutral Plan, the Local Solar Plan, and the City’s broader environmental sustainability goals, including those set out in the 2011 Utilities Strategic Plan and the 2007 Climate Protection Plan.

ENVIRONMENTAL IMPACT

The UAC’s review of staff’s proposed NEM successor program and grandfathering policy does not meet the California Environmental Quality Act’s (CEQA) definition of “project” under California Public Resources Code Sec. 21065, thus no environmental review is required.


ATTACHMENTS

- A. Proposed Net Energy Metering Successor Rate Schedule E-EEC-1
- B. Implementation of Council-Adopted Net Energy Metering (NEM) Successor Program Design Guidelines
- C. Bill Illustration for Residential Customer with Solar PV System under the Proposed NEM Successor Rate
- D. Energy Freedom Coalition of America Comments to Palo Alto City Council

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ED SHIKADA

Assistant City Manager/Interim Director of Utilities

ATTACHMENT A

EXPORT ELECTRICITY COMPENSATION

UTILITY RATE SCHEDULE E-EEC-1

A. APPLICABILITY:

This schedule applies in conjunction with the otherwise applicable rate schedules for each customer class. This schedule may not apply in conjunction with any time-of-use rate schedule. This schedule applies to Customer-Generators as defined in Rule and Regulation 2 who are either not eligible for Net Energy Metering or who are eligible for Net Energy metering but elect to take service under this rate schedule.

B. TERRITORY:

Applies to locations within the service area of the City of Palo Alto.

C. RATE:

The following buyback rate shall apply to all energy exported to the grid.

	<u>Per kWh</u>
Export electricity compensation rate	\$0.07485

D. SPECIAL CONDITIONS

1. Metering equipment: Electricity delivered by CPAU to the Customer-Generator or received by CPAU from the Customer-Generator shall be measured using a meter capable of registering the flow of electricity in two directions (aka "bidirectional meter"). The electrical power measurements will be used for billing the Customer-Generator. CPAU shall furnish, install and own the appropriate meter.
2. Billing:
 - a. CPAU shall measure during the billing period, in kilowatt-hours, the energy delivered and received after the Customer-Generator serves its own instantaneous load.
 - b. CPAU shall bill the Customer-Generator consumption charges for the energy delivered by CPAU to the Customer-Generator based on the Customer-Generator's applicable rate schedule.
 - c. In the event the energy generated exceeds the energy consumed and therefore is received by CPAU, the Customer will receive a credit for all energy received by CPAU at the buyback rate designated in section C above.
3. Generation facilities shall adhere to Rule and Regulation 27: Generating Facility Interconnections.

{End}

Implementation of Council-Adopted Net Energy Metering (NEM) Successor Program Design Guidelines

Guideline 1. Rates must be based on the cost to serve customers. This is the overriding principle for the NEM Successor Program development; all other design considerations are subsidiary to this basic premise.

Based on the assessment completed by the City's electric cost of service study consultant and staff, the proposed NEM successor rate is based on the cost to serve.

Guideline 2. Consider and evaluate program options that compensate customers fairly and equitably for local renewable energy production.

The combination of tiered, electric rate structures and NEM make solar installations on high-energy consuming households considerably more cost-effective compared to low- or average-energy consuming households. This combination hinders solar adoption by households that have average or low electricity consumption achieved through conservation and energy efficiency measures. The proposed NEM successor rate, which provides a flat rate based on the utility's avoided cost for any energy exported to the grid, provides equitable and fair compensation to customers. Any energy generated that is used immediately on-site would effectively receive retail rate compensation for avoided energy purchases, similar to how a customer would be compensated for implementing an energy efficiency measure.

Guideline 3. Consider and evaluate compensating solar participants at a rate equivalent to the value of solar to Palo Alto via "value of solar tariff".

A "value of solar tariff" is a rate design in which customers are compensated at a specified rate for all generation produced from their on-site systems. On-site consumption is metered separately and charged in full at the applicable retail rate for that customer class. It is often referred to as a "buy-all, sell-all" rate option, where no energy is netted on-site as is the case with the staff proposal. The compensation rate for the on-site generation would be based on the value of local solar energy generation calculated using avoided cost models that are utilized in all of the City's resource acquisition and financial planning. An advantage of the value of solar tariff design is that it utilizes a standardized and transparent framework for valuing distributed generation that would be updated regularly.

Staff ultimately did not propose a "value of solar tariff" option for two reasons. First, the customer may feel unsatisfied that generation from a solar PV system is not counted on a kilowatt-hour basis toward reducing on-site consumption, as is the case with an energy efficiency measure. Second, this option would require installing a second meter at the customer premise to measure all generation from the on-site system, adding cost and requiring significant changes to current processes and systems to implement.

Guideline 4. Consider and evaluate the impact on the concurrent adoption of on-site generation and other demand-side technologies.

Many of the same motivations that drive the adoption of solar PV may also drive customers to adopt other advanced energy technologies, such as electric vehicles (EVs), energy storage, smart thermostats, and building energy management systems. Staff evaluated the impact of the concurrent adoption of a solar PV system under the proposed NEM successor rate and other demand-side technologies. The NEM successor rate proposal provides an economic incentive for customers to load-shift to use energy from a solar PV system as it is being generated, prior to being exported to the grid. Customers could load-shift manually by changing behavior patterns, but more likely will utilize programmable and controllable loads, such as one or more of those listed above.

Regarding energy storage in particular, currently the market for storage systems for residential customers in Palo Alto is extremely limited. CPAU has offered a pilot time-of-use rate¹ to approximately 120 residential customers through the CustomerConnect advanced metering pilot program. However, the price differential between summer peak usage compared to summer off-peak usage is 7.64 cents per kWh, which is not sufficiently high to make behind-the-meter energy storage cost-effective based on current storage cost estimates, excluding any other potential benefits beyond energy arbitrage (charging the battery when the retail rate is lower and discharging to meet energy needs when the retail rate is higher). The proposed NEM successor rate would provide 9.416 cents per kWh differential that could be captured by energy arbitrage, which is the difference between the value of exported energy and the highest residential rate tier, thus increasing the value stream to prospective storage systems and expanding the storage market beyond the CustomerConnect pilot participants. Staff plans to bring forward an updated energy storage assessment for review in 2017, which will evaluate a variety of use cases, including residential and non-residential applications. Furthermore, staff is currently evaluating responses to a competitive solicitation called “Solutions to Leverage the Value of Distributed Energy Resources within the City of Palo Alto”, some of which could utilize behind-the-meter storage, in addition to other advanced energy technologies discussed above.

Guideline 5. Consider and evaluate the likely impact on the rate of solar adoption and implications for meeting the Local Solar Plan goal.

The overarching Local Solar Plan goal is to meet 4% of the City’s load from local solar by 2023, which translates to achieving 23 MW of installed local solar PV capacity. As discussed in the 2015 update on the Local Solar Plan ([Staff Report 6649](#)), the Local Solar Plan goal could be achieved with current and planned programs, existing incentives, and realistic forecasts for falling solar system prices. The analysis supported that the City could meet the goal without expanding rebates or NEM incentives beyond the 9.5 MW cap. Since that time, the 30% federal ITC was extended through the end of 2019, which provides substantial unexpected support for solar deployment. Palo Alto’s progress toward meeting the Local Solar Plan goal will be reevaluated on an ongoing basis as new policies and programs come forward for review.

¹ <http://www.cityofpaloalto.org/civicax/filebank/documents/32678>

Guideline 6. Consider the ease of marketing and communicating the program to customers.

Utilities customers are increasingly seeking more detailed information regarding their energy usage and costs, which makes communications and marketing considerations a primary concern in the development of rates and programs. During the research and development of a NEM successor rate, staff evaluated all rate options based on a number of criteria, including specifically the ease of marketing and communication. Utilities communications and marketing staff have assessed the proposed NEM successor rate and did not identify any significant communications-related barriers for the proposed program. Furthermore, at this point in time, staff does not anticipate needing additional resources for NEM successor program marketing and outreach efforts.

Guideline 7. Assess technology constraints of program implementation.

The seventh design guideline was to assess all technology constraints for implementing the proposed NEM successor rates and alternatives, along with associated staff and budget resource impacts. Staff evaluated a broad variety of NEM successor rate options and identified compatibility of each to CPAU's existing systems and processes, such as the customer information and billing system and metering infrastructure. A mandatory time-of-use rate is not recommended because of the substantial resource impact of manually implementing such a rate prior to having full advanced metering infrastructure (AMI) deployment and a billing system capable of automatically processing the bills. AMI is identified as a long-term rate design issue for the electric COSA, and evaluation of time-of-use and other rate structures that AMI enables will be evaluated during Phase Two of the Electric COSA work plan. The NEM successor program will be revisited at that time in coordination with the COSA.

Guideline 8. Consider and evaluate the impact on non-solar customers.

The proposed NEM successor rate is based on the cost to serve, and the credit value would be updated annually to reflect the market value of solar energy, value of the RECs, avoided capacity charges, avoided transmission and distribution system losses, and avoided charges for transmission and ancillary services. Therefore, there would be no direct financial resource impact for eligible systems installed under the NEM successor.

Bill Illustration for Residential Customer with Solar PV System under the Proposed Net Energy Metering (NEM) Successor Rate

Table 1 below estimates the potential electric utility bill of a residential customer installing a solar photovoltaic (solar PV) system under the proposed Net Energy Metering (NEM) successor rate with a solar system sized to meet 50% of the customer's energy usage on site. Each column is labelled as follows.

1. Total Energy Consumption (kWh): This column shows the customer's total energy consumption on a monthly basis. This customer uses 12,184 kWh over the entire year, which is approximately two times the average residential consumption.
2. Solar Energy Production (kWh): This column shows the total energy generated from the customer's solar PV system. This simplified example assumes that the customer sized the solar PV system to meet 50% of the total annual energy consumption shown in column 1.
3. Solar Energy Netted On-site (kWh): Under the proposed NEM successor rate, a customer's solar PV generation will first meet simultaneous on-site energy needs, and then any excess energy generation is sent to the grid. This column shows the amount of energy that is netted on-site to meet instantaneous customer needs, which was estimated from analyzing hourly load data from the CustomerConnect advanced metering pilot and hourly generation data from the National Renewable Energy Laboratory's PVWatts Calculator¹.
4. Solar Energy Sent to the Grid (kWh): This column shows the amount of energy sent to the grid, summed over hours of the day when solar PV production exceeds on-site load.
5. Energy Delivered to Customer (kWh): This column shows the amount of energy delivered by the utility to the customer. This includes energy delivered at night and during times of the day when the customer's on-site energy needs exceed the on-site solar PV generation.
6. Bill Charges for Energy Delivered: This column shows monthly bill charges to the customer after applying the proposed residential retail rate in the accompanying UAC report to the energy quantity shown in column 5.
7. Bill Credit for Energy Sent to the Grid: This column shows the monthly bill credits to the customer after applying the credit rate (7.485 ¢/kWh) to the energy quantity in column 4.
8. Monthly Bill with Solar: This column shows the customer's monthly utility bill with their solar PV system under the NEM successor rate, after taking column 6 and subtracting column 7. During summer months, for some customers the credit for exported energy may exceed charges applied to the energy delivered to the customer, resulting in net credit.
9. Monthly Bill without Solar: This column shows what the customer's monthly utility bill would have been without a solar PV system. The calculation takes the consumption in column 1 and applies the proposed residential retail rate.
10. Monthly Bill with Solar under NEM: This column shows what the monthly utility bill would be for a solar PV system installed within the NEM cap. The calculation takes the difference between total consumption and generation and applies the proposed residential retail rate.

¹ <http://pvwatts.nrel.gov/>

Attachment C

Table 1: Bill Illustration of a Residential Customer with a Solar PV System under the Proposed NEM Successor Rate

Month	1. Total Energy Consumption (kWh)	2. Solar Energy Production (kWh)	3. Energy Netted On-site (kWh)	4. Solar Energy Sent to the Grid (kWh)	5. Energy Delivered to Customer (kWh)	6. Bill Charges for Energy Delivered	7. Bill Credit for Energy Sent to the Grid*	8. Monthly Bill with Solar	9. Monthly Bill Without Solar	10. Monthly Bill with Solar Under NEM
Jan.	1,400	327	244	84	1,156	\$175	(\$6)	\$169	\$217	\$161
Feb.	1,204	314	250	64	954	\$143	(\$5)	\$138	\$184	\$132
Mar.	1,061	519	309	210	752	\$107	(\$16)	\$91	\$160	\$72
Apr.	918	610	311	299	607	\$83	(\$22)	\$61	\$136	\$34
May	885	704	341	363	543	\$72	(\$27)	\$45	\$130	\$20
June	882	659	352	307	530	\$70	(\$23)	\$47	\$130	\$25
July	929	711	377	334	552	\$73	(\$25)	\$48	\$138	\$24
Aug.	894	582	312	270	582	\$78	(\$20)	\$58	\$132	\$34
Sept.	930	551	301	250	629	\$87	(\$19)	\$68	\$138	\$45
Oct.	943	467	266	201	677	\$94	(\$15)	\$79	\$140	\$60
Nov.	954	348	191	157	764	\$110	(\$12)	\$98	\$142	\$83
Dec.	1,184	299	198	101	985	\$147	(\$8)	\$139	\$180	\$130
Total:	12,184	6,092	3,452	2,640	8,732	\$1,240	(\$198)	\$1,042	\$1,825	\$820

*All credits shown in parentheses.

Table 2: Annual Bill Comparison of Residential Customer with a Solar PV System

Annual Bill Comparison for Customer Illustration	
Annual Bill with Solar under Proposed NEM Successor Rate (column 8)	\$1,042
Annual Bill with Solar under NEM (column 10)	\$820
Annual Bill Difference Between NEM and NEM Successor	\$220
Annual Bill without Solar (column 9)	\$1,825



December 30, 2015
City of Palo Alto, City Council
250 Hamilton Ave.
Palo Alto, CA 94301

Re: Item #5, Finance Committee Recommendation that the City Council Approve Design Guidelines for the Net Energy Metering Successor Program – OPPOSE UNLESS AMENDED

Dear Members of the City Council,

Energy Freedom Coalition of America ("EFCA") is a national advocacy group that seeks to promote both the public awareness of the benefits of solar and alternative energy, as well as the use of rooftop and other customer-owned and third-party owned distributed solar electrical generation, for residential and commercial applications. EFCA applauds the City of Palo Alto Utilities' (CPAU) effort to undertake a thorough and thoughtful process in developing a solar program that will continue to promote rooftop solar adoption for Palo Alto's residents. However, the guidelines as currently written are incomplete and should not be approved. Before the City Council approves the proposed guidelines, we recommend adding a new guideline and expanding several of the current guidelines.

New Guideline

We strongly recommend that a new guideline be added, for a total of 7 guidelines.

New Guideline: Evaluate the benefits and costs of continuing the NEM program without modification after the cap has been reached.

CPAU has the authority to continue its NEM program after the cap has been reached, and should strongly consider this option. NEM is a simple, effective, and reliable payment mechanism that fairly compensates solar customers for the value their systems provide to the grid. NEM has been crucial to the widespread adoption of solar in California, and now exists in 44 states. In California, NEM has leveraged more than \$10 billion in private investment, reduced electricity demand, and helped support more than 54,000 in-state jobs. Rooftop solar is vital to continue growing the clean energy economy, both locally and across the state, and to meeting the state's ambitious clean energy goals. Continuing NEM will provide market certainty and predictability, and will help local homeowners, schools, and businesses to save on their electric bills while reducing greenhouse gas emissions. Moreover, NEM requires only a single meter, provides a form of compensation that is not subject to federal income tax, and gives customers the satisfaction of offsetting their own usage with renewable power.

If changes to the current NEM program are considered, CPAU should examine changes that "phase-in" gradually over time. One of the most successful programs in the country for promoting rooftop solar at a reasonable cost was the California Solar Initiative, which was structured as a 10-year program with

incentives that stepped down gradually and predictably as the solar market grew in size. This program design worked well because the long-term nature of the program sent a signal to investors that the incentive regime would not change abruptly, while the gradual step-down of incentives aligned the incentive structure with the long-term solar cost trajectory. When designing any successor NEM tariff, CPAU should consider one that creates long-term stability and predictability for the market, rather than one that could be reviewed and changed on an ad hoc basis.

Modifications to Existing Guidelines

In addition to the new guideline listed above, we recommend several modifications to the existing guidelines.

Current Guideline 1: Evaluate program options that compensate customers fairly and equitably for local renewable energy production.

Proposed Guideline 1: Evaluate program options that compensate customers fairly and equitably for local renewable energy production. *Consider environmental benefits, short-term and long-term system cost savings from behind-the-meter, and consistency with the objectives of AB 327.*

Behind-the-meter solar provides several benefits to the grid which results in reduced costs for all ratepayers. In the short-term, when a generation resource is located behind a customer's meter, it is avoiding line losses when compared to more remote generation that is delivered across transmission and distribution facilities. In the long-term, distributed generation may enable a utility to avoid or defer large-scale capital transmission and distribution projects and associated maintenance and upgrades. CPAU's NEM successor program should adequately take into account these avoided costs when assessing any perceived "cost-shift" between solar and non-solar customers.

Should CPAU choose not to continue its current NEM program after the cap has been reached, the successor program should be aligned with the goals and requirements outlined in Assembly Bill 327 (AB 327). While AB 327 has directed the CPUC to adopt a successor program to NEM by 2016, the new program must ensure that (1) the total benefits of the new tariff must be equal to the total costs; and (2) customer-sited renewable distributed generation continues to grow sustainably. All NEM successor programs considered by CPAU should be consistent with these requirements. There are a number of changes that could be made to the existing NEM program, such as minimum bills for NEM customers that could address ratepayer equity issues while maintaining a viable NEM program that continues progress toward CPAU's energy and climate goals.

Current Guideline 2: Consider compensating solar participants at a rate equivalent to the value of solar to Palo Alto via "value of solar tariff."

Proposed Guideline 2: Consider compensating solar participants at a rate equivalent to the value of solar to Palo Alto via “value of solar tariff”. *Thoroughly review both the positive and negative attributes of a “value of solar tariff”.*

A “value of solar tariff” (VOST) is a rate design in which customers are compensated at a specified rate based on the value of local solar energy generation for all generation produced from their on-site systems. Unlike NEM, a VOST does not allow a customer to consume their on-site generation before selling to the utility. While a VOST appears to be straight forward and transparent, it has many negative attributes. One primary issue is that a VOST creates a hidden tax for ratepayers, as the income paid to the solar customer by the utility for solar electricity may be subject to income tax, and in some cases may even make customers ineligible for the federal investment tax credit on their solar systems. The fact that VOSTs may be regularly updated also poses an issue, as this wavering rate guarantees regular market uncertainty that can be harmful to solar customers. Customers in states like Texas and Minnesota where VOSTs have been introduced have quickly seen the value compensated to them for their solar decline.

While a VOST may appear to provide a fair market value to distributed generation, its many negative attributes make it a confusing and potentially harmful alternative to NEM. CPAU should carefully examine these issues before considering a VOST as a fair alternative to NEM.

Current Guideline 5: Consider the ease of marketing and communicating the program to customers.

Proposed Guideline 5: Consider the ease of marketing and communicating the program *to new and existing customers. Prioritize a program design that is easy to understand, and does not harm existing NEM customers.*

NEM is a simple, easy to understand, and trusted program that has been in effect in California for almost two decades, making it the most established state incentive for solar and other distributed generation technologies. CPAU should carefully consider the significant customer outreach and education that will be necessary to minimize confusion and harm to behind-the-meter solar adoption should the NEM successor program differ significantly from the current NEM program.

CPAU should ensure that any NEM successor tariff does not harm existing NEM customers. When customers make the substantial investment to buy a rooftop solar system, they typically assume that their electric rate and NEM compensation mechanism will not change for the life of the solar system. Requiring existing NEM customers to transition onto a new tariff will change the return on investment for those customers in a way most likely did not expect. The CPUC has approved a NEM transition period that allows current NEM customers to continue on their current NEM tariff for 20 years after their install date. The CPAU should carefully consider the impact on existing NEM customers when developing a successor tariff and should provide guidance on a transition plan.

Palo Alto has long been a leader in innovative rate and program designs, and we hope this post-NEM program continues that trend. Thank you for taking comments on this important issue. We look forward to working with you as this process continues.

Regards,

A handwritten signature in black ink, appearing to read "Julia Jazynka". The signature is fluid and cursive, with the first name "Julia" written in a larger, more prominent script than the last name "Jazynka".

Julia Jazynka
Associate
Energy Freedom Coalition of America, LLC