MEMORANDUM

TO: **UTILITIES ADVISORY COMMISSION**

FROM: **UTILITIES DEPARTMENT**

DATE: **November 4, 2015**

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SUBJECT: **Staff Recommendation that the Utilities Advisory Commission Recommend that the City Council Approve Design Guidelines for the Net Energy Metering Successor Program**

REQUEST

Staff recommends that the Utilities Advisory Commission (UAC) recommend that the City Council approve the Design Guidelines for the Net Energy Metering Successor Program (Attachment A).

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. Under the City's current rates, NEM customers can reduce, or potentially completely avoid, charges on their electric bill while still remaining interconnected with the electric grid and utilizing grid services.

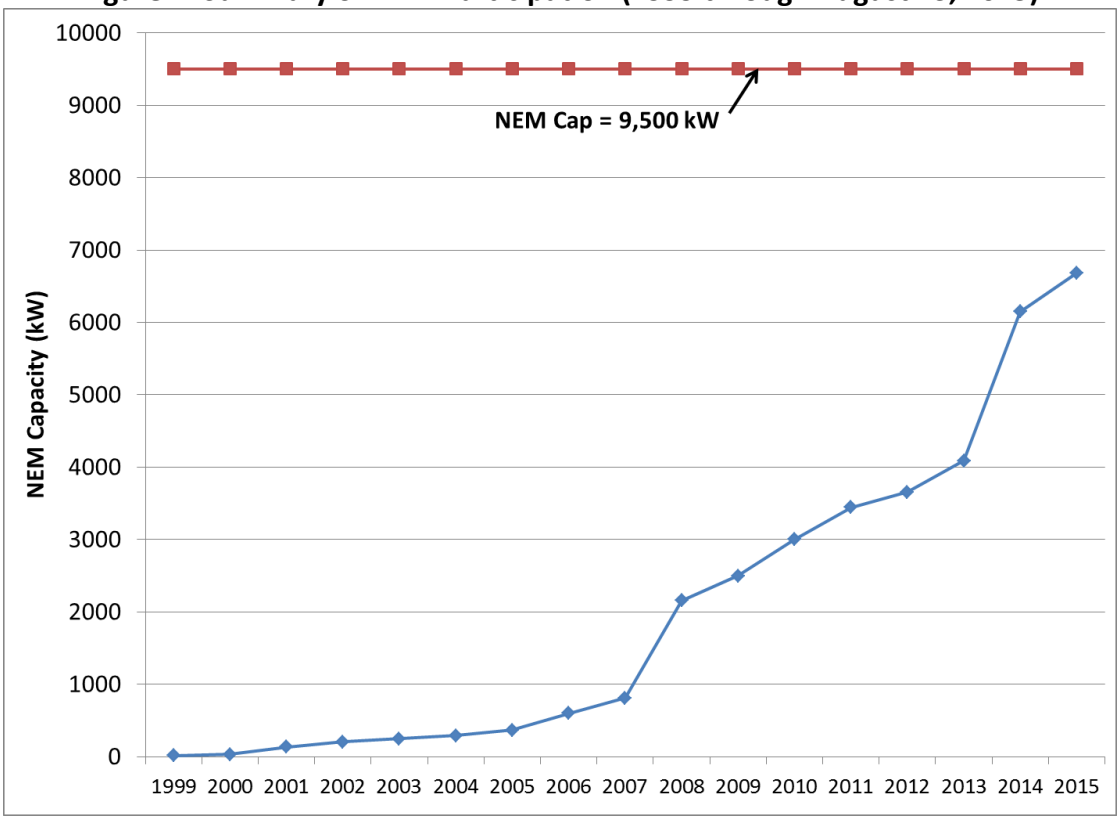
State law requires all electric utilities to offer NEM to customers with eligible renewable distributed generation up to a maximum cap (NEM cap). How to compensate customers who install on-site renewable generation after the NEM cap is reached needs to be determined. As Utilities across the state reach their respective NEM caps, NEM successor programs are a topic of much debate; some wish to continue to provide the same incentives to solar participants, while others want to ensure that customers with no on-site generation are not paying more than their share of the costs to maintain the grid. The City of Palo Alto Utilities (CPAU) expects to reach its NEM cap by mid-2017. The proposed NEM successor program design guidelines will guide staff efforts to develop a NEM successor program. CPAU's NEM successor program will be developed in coordination with the electric utility's cost of service analysis (COSA) that is underway.

BACKGROUND

State law requires all electric utilities to offer NEM to eligible customers with renewable distributed generation (sometimes referred to as customer-sited or behind-the-meter

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 August 13, 2015, the City is approximately 70% toward meeting its NEM cap as shown in Figure 1 below. To date, all local solar installations utilize NEM and all net energy metered systems are solar photovoltaic (PV) systems[1].

Figure 1: Summary of NEM Participation (1999 through August 13, 2015)



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 no later than December 31, 2015[2] for the state's investor-owned utilities (IOUs). 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. Publicly-owned utilities

[1] In principal, customers may install a variety of distributed energy technologies on-site that would be eligible for NEM. In practice, staff expects the vast majority—if not all—of on-site generation and NEM participation in Palo Alto to be solar PV.

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

(POUs), whose rates are not regulated by the CPUC, are working with their respective governing bodies and stakeholders to formulate their own NEM successor programs to take affect after their respective NEM caps have been reached.

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 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.

2015 Electric Cost of Service Analysis (COSA)

CPAU embarked on an electric cost of service analysis (COSA) that will be completed in Fiscal Year 2016 (FY 2016) in advance of a rate adjustment that staff projects will be necessary on July 1, 2016. Electric rates were last adjusted when a 10% rate increase went into effect on July 1, 2009. The primary goal of the COSA will be 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. However, the COSA will also include a review of the rate design issues created by increasing numbers of local solar installations, higher EV (EV) penetration, and the potential for building electrification.

The COSA is divided into short-term (Phase One) and long-term (Phase Two) work plans for addressing various rate design issues. Short-term rate design issues include, among other things, the need to develop a NEM successor program for solar customers. In September 2015, Council adopted design guidelines for the Phase One work plan (Staff Report 5956). The adopted Phase One COSA Design Guidelines are provided as Attachment B. The COSA Design Guidelines 1 and 7 are relevant to the development of NEM successor design guidelines and the ultimate NEM successor program. These two guidelines are listed below:

- Guideline 1: Rates must be based on the cost to serve customers. This is the overriding principle for the cost of service analysis (COSA); all other rate design considerations are subsidiary to this basic premise.
- Guideline 7: The COSA should evaluate the impact of rate designs on the economics of local solar for current and future customers and should be coordinated with an analysis of long-term solar policies to be put into effect after the existing net energy metering tariff reaches capacity.

DISCUSSION

This memo describes a proposed set of secondary design guidelines for the development of a NEM successor program—the NEM Successor Program Design Guidelines. These design guidelines are intended to be supplementary guidelines to the Phase One Electric COSA Design

Guidelines and are relevant specifically for eligible customer-sited renewable generation that will be installed after the City's NEM cap has been reached.

Key Challenges and Benefits of NEM

There are three primary challenges with NEM. First, given the City's existing electric rate structures, NEM results in cost-shifting between customer classes. Customers who adopt distributed generation and utilize NEM can reduce or completely avoid costs on their electric utility bills even though they remain interconnected to the grid and continue to use grid services.

Second, distributed generation presents challenges for utilities to sustainably recover the fixed costs associated with the electric distribution system. As distributed generation continues to be deployed, the cost-shift from NEM to non-participating customers increases. This results in increasingly higher rates for non-participating customers, which in turn makes adopting distributed generation even more attractive for non-participating customers. This positive feedback loop is often referred to as the "utility death spiral. Again, the overriding principle for rate design is captured in the first Electric COSA Design Guideline (Rates must be based on the cost to serve customers) and any NEM successor rate must be consistent with this principle.

Third, an increasing block electricity rate structure, (or tiered rate structure such as the one in use in Palo Alto[3]), can create situations in which highly efficient, low-energy use NEM customers receive a lower NEM compensation rate than high-energy consuming NEM customers. Low-energy consuming households who conserve and have implemented many home energy efficiency measures may only reach the first or second electricity usage tiers over the course of a month[4]. For example, if a household that consumes 600 kilowatt hours (kWh) per month installs a solar PV system that is sized to meet all of the household's electricity usage over the course of the year, the household would, in effect, be compensated at a rate of 11.2 ¢/kWh for the energy generated from their on-site system under the current rate structure[5]. By contrast, if a higher energy-using household using 1,200 kWh/month installs a solar system of the exact same size as the lower-energy consuming household, the high-energy consuming household is effectively compensated at 17.4 ¢/kWh for the energy generated from their on-site system. Therefore, high-energy use consumers are compensated at a significantly higher rate than low-energy use consumers for distributed renewable electricity, although the value of the output may be equivalent. As a result, NEM combined with tiered rate structures discourages solar adoption by low-energy consumers.

It is important to emphasize that the challenges discussed above are amplified by the combination of NEM and the existing tiered electric rate structure. For example, if through the

[3] http://www.cityofpaloalto.org/civicax/filebank/documents/8089

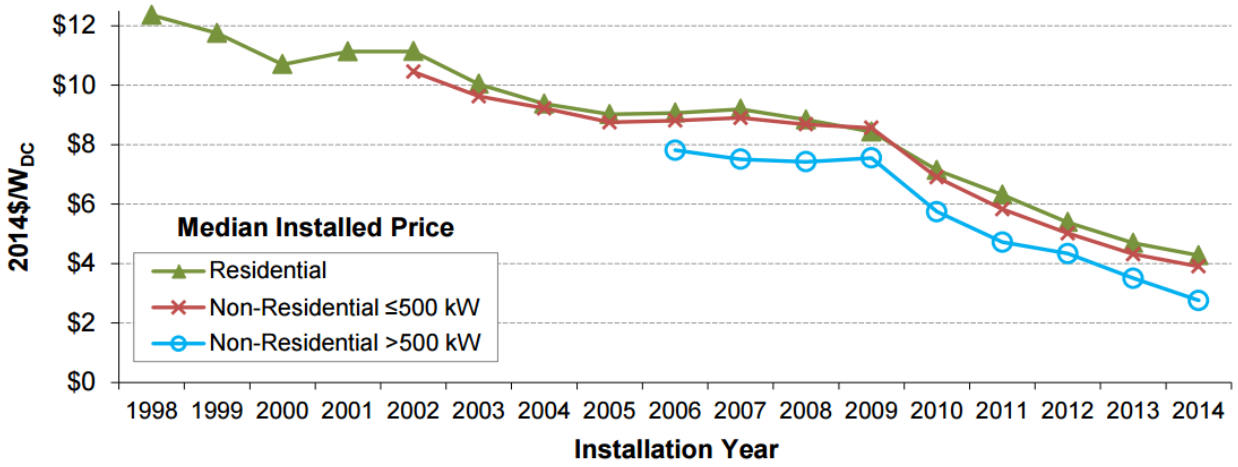
[4] The average monthly electricity consumption of single-family homes in Palo Alto in 2014 was 621 kWh. Tier 1 is between 0-300 kWh (9.5 c/kWh), Tier 2 is between 301-600 (13 c/kWh), and Tier 3 is for all electricity over 600 kWh (17.4 c/kWh).

[5] The average price of electricity for a residential customer using 600 kWh is the sum of 300 kWh times Tier 1 price (9.5 c/kWh) and 300 kWh times Tier 2 price (13 c/kWh), then divided by 600 kWh, or 11.2 c/kWh.

upcoming electric COSA, the residential electric utility rate structure were modified to include a minimum charge, the degree of cost-shifting from NEM customers to non-participants may be reduced or averted. As electric rate structures change in the future, the relationship between the rate structure and NEM will be re-evaluated[6]. Hence, development of a NEM successor program is being carried out in coordination with the electric COSA, and the evaluation and quantification of potential cost-shifts will be performed as a part of the NEM successor program development process.

Although NEM has limitations, it also has key benefits. NEM is often described as "rolling back the electricity meter" with generation from an on-site system. This description is especially intuitive, which makes it a relatively easy policy to communicate to utility customers and other stakeholders. Operationally, NEM can and has been implemented with existing metering equipment. Non-standard meters or advanced metering infrastructure ("smart meters") are not required. And, more broadly, NEM is often viewed as one of the key state policies responsible for the extent of solar deployment that has been realized in California to date[7]. These policies, and California's Renewable Portfolio Standard (RPS) mandate, have been very effective in developing the solar PV market and reducing costs of solar over time as shown in Figure 2.

Figure 2: Installed prices for residential and small non-residential systems in the U.S.[8]



Short-Term and Long-Term Considerations

The proposed NEM Successor Program Design Guidelines are aligned with the COSA Design Guidelines in addressing short-term rate design issues. Staff anticipates the NEM cap will be met within the coming one to two years. New rules and rates should be ready for customers

[6] The key challenges could instead be interpreted as limitations of the existing rate structures rather than limitations of NEM. These rate structure challenges are in turn dependent upon the service territory's metering infrastructure, customer information system, and billing system.

[7] Another key California policy is the Million Solar Roofs Bill (aka Senate Bill 1 or SB1) which required that electric utilities provide rebates to customers installing PV systems until the mandated rebate funds are exhausted.

[8] Source of Figure 2 is *Tracking the Sun*, an annual 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 October 16, 2015)

who install solar systems after the NEM cap is reached. Long-term rate design issues—including, for instance, updated climate protection goals, deployment of advanced metering infrastructure and the rate designs which they enable, and impacts of the trend toward electrification—will be addressed in the second phase of the COSA work plan. The NEM successor program that is in place at that time may be revisited, along with all other rates.

Proposed NEM Successor Program Design Guidelines

Staff proposes the following NEM Successor Program Design Guidelines:

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

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

Guideline 3. Evaluate the impact on the concurrent adoption of on-site generation and other demand-side technologies.

Guideline 4. Assess the likely impact on the rate of solar adoption and implications for meeting the Local Solar Plan goal.

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

Guideline 6. Assess technology constraints of program implementation.

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

With tiered electric rates and NEM, the effective compensation that customers receive for their on-site generation is based on their monthly amount of on-site energy consumption as described above. This combination hinders solar adoption by households that have average or low electricity consumption achieved through conservation and energy efficiency measures. Staff will evaluate NEM successor program options that compensate customers fairly and equitably for local renewable energy production.

Guideline 2. Consider 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. The compensation rate for the on-site generation would be based on the value of local solar energy generation. This value is already calculated using avoided cost models that are utilized in all 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. Also, similar to the rate established for solar through the Palo Alto CLEAN program, it could also provide the flexibility to incorporate an "adder" reflecting the assessed value of distributed generation,

which may be deemed necessary in the near term to continue to promote deployment to achieve the community's local solar goals.

Guideline 3. Evaluate the impact on the concurrent adoption of on-site generation and other demand-side technologies.

Residents or businesses may decide to adopt solar PV for a variety of reasons, including a desire to support environmental sustainability, a penchant for early adoption, or financial benefit. Many of the same motivations may also drive the adoption of other advanced energy technologies, such as EVs, energy storage, smart thermostats, building energy management systems, and grid-interactive loads. Under NEM, co-adoption of solar PV and EVs has been notably common[9]: charging an EV at home drives the household's consumption into higher rate tiers, which in turn renders generation from a net-metered solar system increasingly valuable (under NEM and current electric rates) and therefore more cost-effective. Staff will evaluate the impact of concurrent adoption of on-site generation and other demand-side technologies under various NEM successor program options in order to assess potential impacts.

Guideline 4. Assess the likely impact on the rate of solar adoption and implications for meeting the Local Solar Plan goal.

As described in an update on the Local Solar Plan provided to the UAC in October[10], after accounting for 8 MW from the PV Partners program, 3 MW through the Palo Alto CLEAN program and 2 MW for new community solar and solar donation programs that are under development, almost 10 MW of additional solar capacity is required to meet the Local Solar Plan's goal to have 23 MW of solar PV installed by 2023. Staff will evaluate NEM successor program options regarding their likely impact on the ability to meet the Local Solar Plan goal.

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

NEM has been in effect in California for almost two decades[11], making it the most established state incentive for solar and other distributed generation technologies. Because all education, marketing and outreach efforts conducted over the past two decades by solar installers, utilities, state agencies, and other stakeholders was conducted while NEM was available, staff anticipates that significant efforts may be required to market and communicate a new set of terms and conditions that comprise the NEM successor program. Of course, that will depend on how different the NEM successor program may be from the original NEM. Furthermore, more generally, customers need an increasingly detailed understanding of all aspects of their energy usage and costs, which makes communications and marketing considerations a primary concern during the program design stage. Staff intends to assess the ease of marketing and communicating to customers during research and development of the NEM successor program. Staff may also recommend additional resources to enhance associated education and outreach efforts, if needed, to ensure customer and stakeholder understanding and awareness.

[9] In a recent analysis, installing EV charging equipment in Palo Alto was the strongest indicator for household participation in the PV Partners program for a solar PV rebate. The other indicators incorporated in the analysis were participation in nine distinct other demand-side energy efficiency programs.

[10] https://www.cityofpaloalto.org/civicax/filebank/documents/49290

[11] The original NEM law in California was adopted in 1995 and took effect the following year.

Guideline 6. Assess technology constraints of program implementation.

The sixth and final design guideline is to assess all technology constraints for implementing the proposed NEM successor program and alternatives, along with associated staff and budget resource impacts. Potential technology constraints include compatibility with CPAU's existing customer information and billing systems and metering infrastructure.

Advanced metering infrastructure (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.

NEXT STEPS

The tentative timeline for the review and approval of the NEM-related policies anticipates that a NEM Successor program can be considered by Council by the end of FY 2016 as shown below.

Tentative Timeline for Review and Approval of NEM Successor Program Policies

Description	UAC	Finance Committee	Council
NEM cap clarification	--	--	Nov. 2015
Design Guidelines for NEM Successor Program	Nov. 2015	Dec. 2015	Jan. 2016
Proposed NEM Successor Program	March 2016	April 2016	May 2016

RESOURCE IMPACT

Adoption of the proposed NEM Successor Program Design Guidelines has no direct impact on budget and staff resources as this work is part of the FY 2016 work plan and will be done by existing staff. Upon adoption of the design guidelines, staff will proceed with the development of a NEM successor program and any associated resource impact of the proposed NEM successor program and potential alternatives will be assessed and included in the staff report when the proposal is brought forward for review and approval.

POLICY IMPACT

The process of adopting the NEM Successor Program Design Guidelines provides the UAC and Council an opportunity to provide policy guidance to staff for the development of a NEM successor program proposal in coordination with the electric COSA. Fulfilling the City's NEM legislative mandates and developing an effective NEM successor program will support the Carbon Neutral Plan, the Local Solar Plan, and State and local efforts to promote renewable distributed generation. NEM further supports 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

Adoption of NEM Successor Program Design Guidelines 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 Design Guidelines for the Net Energy Metering Successor Program
B. Adopted Design Guidelines for the 2015 Electric Cost of Service Analysis

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Attachment A

Design Guidelines for the Net Energy Metering Successor Program

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

2. Consider compensating solar participants at a rate equivalent to the value of solar to Palo Alto via “value of solar tariff”.

3. Evaluate the impact on the concurrent adoption of on-site generation and other demand-side technologies.

4. Assess the likely impact on the rate of solar adoption and implications for meeting the Local Solar Plan goal.

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

6. Assess technology constraints of program implementation.

Attachment B

Design Guidelines for the 2015 (Phase One) Electric Utility Cost of Service Analysis

1. Rates must be based on the cost to serve customers. This is the overriding principle for the cost of service analysis (COSA); all other rate design considerations are subsidiary to this basic premise.

2. For this cost of service study, and to the extent feasible, energy charges should be based on existing rate structures. This includes:
    a. A tiered rate design structure for residents
    b. A flat general service rate for small non-residential users
    c. A flat demand and energy rate for large non-residential users

3. The COSA should involve a review of all existing rate schedules for inclusion in the COSA or retirement.

4. The COSA should take into account the impact of rate designs on electric vehicles and electric heating customers, and should investigate:
    a. the extent to which these customers have different load profiles from other residential customers; and
    b. the extent to which existing rate designs should be adjusted for these differing load profiles

5. The COSA should evaluate the need for a minimum charge.

6. A hydroelectric rate adjustment mechanism should be evaluated.

7. The COSA should evaluate the impact of rate designs on the economics of local solar for current and future customers and should be coordinated with an analysis of long-term solar policies to be put into effect after the existing net energy metering tariff reaches capacity.

8. A connection fee study should be performed and policies regarding residential transformer upgrades should be reviewed, either as part of the COSA or as part of a parallel analysis. The COSA methodology should be coordinated with any potential connection fee changes or policy changes.

9. The impact of any proposed changes on low income customers should be evaluated