



## STAFF REPORT

<b>TO:</b>	<b>Roseville Public Utilities Commission</b>
<b>WRITTEN BY:</b>	<b>Philip McAvoy, Electric Rates and Financial Administrator Joanna Cucchi, Senior Electric Business Analyst</b>
<b>APPROVED BY:</b>	<b>Michelle Bertolino, Electric Utility Director</b>
<b>SUBJECT:</b>	<b>Roseville Solar 2.0 - Net Energy Metering Successor Program</b>

Meeting Date: May 23, 2017

### **SUMMARY**

California state law requires electric utilities to compensate rooftop solar customers with net energy metering (NEM). Under NEM, solar customers can sell electricity they don't use back to the electric utility. NEM requires electric utilities to pay customers for solar generation at a rate that is higher than the value of the electricity to the utility.

The purpose of California's NEM law is to encourage installation of solar photovoltaic systems on residences and businesses, less reliance on fossil fuels and private investment in renewable energy.

The law allows electric utilities like Roseville to create a new NEM program, referred to in legislation as a NEM successor program, once a specific level of rooftop solar is installed. Roseville expects to reach the NEM "cap" by October 2018.

Roseville Electric Utility staff recommend that the Roseville Public Utilities Commission recommend approval of the NEM successor program as described below (referred to as Roseville Solar 2.0), effective October 2018, to the City Council. Staff recommends that the new program be approved well before the old program is discontinued to provide interested customers adequate time to make decisions regarding solar installation.

### **BACKGROUND**

California's state mandated NEM program requires electric utilities to pay customers the full retail rate for electricity generated by their rooftop solar photovoltaic (PV) systems. Solar customers in Roseville still rely on the City's electric grid to receive electricity at night and when they cannot generate sufficient electricity (due to weather, system issues, shading, etc.).

Under the current NEM program, solar customers can avoid paying the full cost of service to use the electric grid. This shifts their share of utility costs on to non-solar customers, some of whom are low income, or live in multi-family complexes, or whose roofs are not suitable for solar panels.

**For more details on NEM costs in the electric industry please refer to Attachment B, an excerpt from an article published by the Edison Electric Institute.**

Current NEM in Roseville

In Roseville, the full retail rate paid to solar customers under the current state required NEM program is, on average, 11.4 cents per kilowatt-hour. Less than half of this full retail rate, approximately 4 cents, is attributable to the actual electricity that is paid to customers. There is approximately another 2 cents of avoided costs associated with local solar production. The remaining 5.4 cents covers energy-related services that benefit all customers. These services include: operations and maintenance of the electric “grid”, state mandated public benefits programs, franchise fees for police fire, parks and libraries (per the City Charter), plus traffic signals and streetlights.

Other energy related service costs that are avoided through NEM include electric system infrastructure and energy that the utility must have available at all times for all customers, whether or not their solar systems are operating. For example, when the sun is not shining or part of a PV system is not working, little if any electricity is generated. The electric system infrastructure must be built to accommodate the maximum amount of electricity that customers may use at any time of the day or night. Undersized electric systems can result in outages, significant safety issues, and have significant impacts on the City’s residents and businesses. The utility must have energy available and infrastructure in place to deliver electricity, whether or not solar customers’ systems are generating electricity.

Table 1 below provides a comparison of the amount paid to current NEM customers compared to the avoided costs for the utility system and extra costs borne by non-solar customers:

Table 1

Current NEM program - price per kilowatt hour (in rounded cents)			
	Paid to customer	Utility’s avoided costs (savings)	Costs left uncollected
Energy	4	4	0
Energy related services (grid operations, etc.)	5.4	0	5.4
Value of solar to utility	2	2	0
<b>Total</b>	<b>11.4</b>	<b>6</b>	<b>5.4</b>

The current NEM program in Roseville results in solar customers receiving benefits that they do not pay for and resulting in cost shifts to non-solar customers.

State law allows utilities to replace the state mandated NEM program with a new program once rooftop solar installations in their service territory reaches a certain level.

The NEM maximum capacity or “NEM cap” is defined as 5% of a utility’s maximum system peak demand. Roseville expects to reach this level (its “net energy metering cap”) by October 2018. The intent of the net energy metering cap is to initially provide statewide monetary incentives (in addition to state and federal tax incentives) for solar installations and to phase out the incentive once the solar installations reach 5% market penetration based on system load.

### Proposed new NEM program - Roseville Solar 2.0

Roseville City Council goals and priorities provide overarching direction and guidance for all policies and business decisions made in the course of City business. City Council priorities are:

Public Safety  
Fiscal Soundness  
Economic Development  
Sound and Stable Utilities  
Great Downtown  
Infrastructure  
Legislative Advocacy  
Civic Engagement  
Core Neighborhoods

City Council rate policies provide guidance specific to the electric utility with regard to establishing rates for electric utility customers. The rate policies are:

- Cost-based – design rates to collect revenue that match categories in cost causation including customer, distribution and energy
- Fair and equitable - design rates so that revenues from a customer group match the cost to serve those customers and charge each customer the cost to serve that customer
- Adequate – design rates to generate adequate revenue to safely run the utility
- Stable – incremental increases, avoid large increases, maintain rate stabilization fund

The state required NEM program is not consistent with some Council policies, primarily the rate policies for cost based and fair and equitable rates. However, Roseville Solar 2.0, as proposed, is consistent with adopted City Council priorities and policies. Roseville Solar 2.0 provides value to solar customers based upon the cost of the services they receive, without shifting costs to other customers (who do not receive benefit).

Under Roseville Solar 2.0, new solar customers would receive a credit at a buyback rate, which is calculated based upon the value of the electricity plus avoided costs, for all electricity sent to the utility. They will be billed at the prevailing retail rate for all electricity purchased from the utility, similar to non-solar customers.

The proposed buy back rate for 2018 is **5.98** cents per kilowatt-hour (kWh), which compensates the customer for the energy, avoided capacity charges, avoided

transmission charges, avoided transmission system losses, and avoided renewable portfolio purchases. This rate is not subsidized by non-solar customers. Please see Attachment A for more detail on the metering and calculation changes.

Table 2 below provides a comparison of the amount paid to new solar customers under the proposed Roseville Solar 2.0 program compared to the avoided costs for the utility system and extra costs borne by non-solar customers:

Table 2

Roseville Solar 2.0 program - price per kilowatt hour (in rounded cents)			
	Paid to customer	Utility's avoided costs (savings)	Costs left uncollected
Energy	4	4	0
Energy related services (grid operations, etc.)	0	0	0
Value of solar to utility	2	2	0
Total	6	6	0

Grandfathering existing customers for up to 20 years

Staff also recommends a transition policy for customers with systems installed within the NEM cap, prior to October 2018. Staff proposes adopting a 20-year transition or grandfathering period from the time of interconnection for all customers who install solar by October 2018.

Customers interconnected more than 10 years as of October 2018, will receive 10 full years under the original NEM program (until October 2028). In addition, existing NEM customers may expand their systems by up to 10% of the original system size and will remain eligible for the original NEM program after October 2018. Customers who expand their system prior to October 2018 and sign a new interconnection agreement will be eligible for the 20 year grandfathered program from the new interconnection date.

Utility bills and systems impacts

Implementation of Roseville Solar 2.0 requires modifications to current business systems and processes including purchasing and installing bidirectional electric meters, programming of meter reading devices, training meter reading staff, modifying the format of utility bills, and revising electric usage billing calculations. Modifications to systems and processes are planned to utilize existing staff and budgeted resources.

Summary

Solar Roseville 2.0 will provide:

- Longer term view of the costs and benefits for those interested in installing rooftop solar PV after the current NEM cap has been reached,
- Fairer and more equitable cost allocation for all customers,
- Grandfathering for existing solar customers,
- Consistency with City Council goals, priorities and policies,
- Consistency with state requirements regarding cost-based rates for municipalities.

### **RECOMMENDATION**

Recommend approval of Roseville Solar 2.0, effective October 2018, to City Council.



May 2017

## Roseville Solar 2.0 (Net Metering Successor Program)

### Net Energy Metering

Net energy metering (NEM) is an electric industry billing mechanism designed to promote the installation of renewable distributed generation. This method compensates NEM customers at the full retail rate for all electricity generated by their solar photovoltaic (PV) systems.

### NEM in California

California state law requires all electric public utilities to provide NEM to customers with eligible renewable distributed generation. The NEM law, along with state and federal tax incentives, intends to promote adoption of rooftop solar technology by the public. State law allows utilities to replace NEM with a new program once a utility's installation of PV systems reach a certain level. The NEM maximum capacity or "NEM cap" is defined as 5% of a utility's maximum system peak demand.

### Roseville's NEM PV Capacity

As of April 2017, the Roseville Electric Utility is approximately 70% toward meeting the NEM cap, and expects to exceed it by **October 2018**. Roseville's maximum system peak is 343.45 megawatts (MW). Roseville has 3,350 installed PV systems that have a combined generating capacity of 12.3 MW.

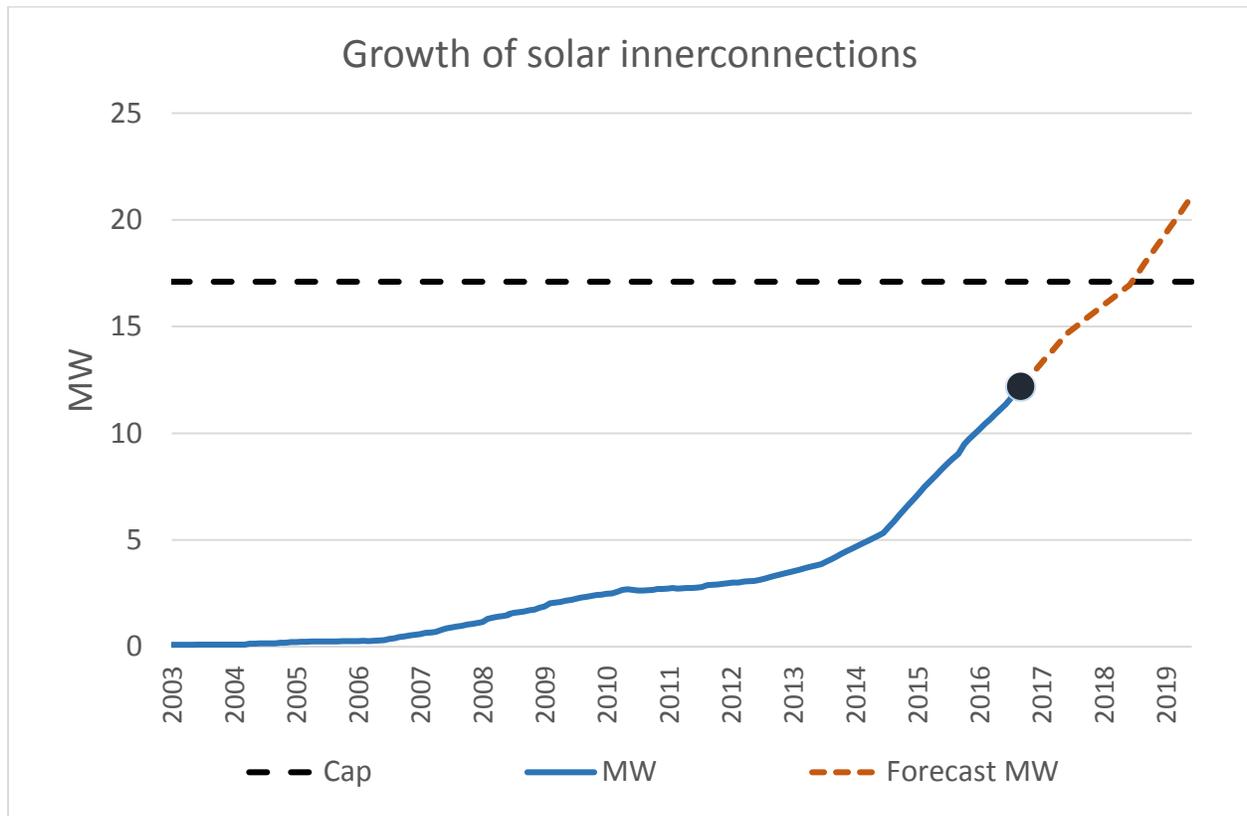
As of April 2017:

- Maximum system peak demand = 343.45 MW
- MW of installed PV = 12.3
- 12.3 divided by 343 = **3.6%** of Roseville system peak

Expected as of October 2018:

- Maximum system peak demand = 343.45 MW
- MW of installed PV = 17.1725
- 17.1725 divided by 343.45 = **5.0%** of Roseville system peak

**Roseville's recent and projected PV growth**  
Figure 1



### **NEM subsidies**

Under the City's current electric rate structure, NEM customers can reduce, or completely avoid, charges on their electric utility bill while still connecting with the electric grid and utilizing electric programs and services. A traditional energy rate recovers the cost of power, the cost to maintain the grid, debt service on generating and distribution system assets, the cost to run mandated programs, and the cost of back office regulatory, planning and administrative functions. The NEM billing method allows the customer to avoid the cost of receiving energy from the utility. A NEM customer also avoids the costs to the utility to maintain the electric grid and to have generating assets available when the sun is not shining. These NEM costs are passed on to non-NEM customers. This is inconsistent with City Council priorities, and the utility's financial and rate policies.

### **Roseville Solar 2.0**

Customers who install PV or purchase a brand new home with PV after Roseville's NEM cap is reached will be enrolled in the utility's new program, Roseville Solar 2.0. Customers in the Roseville Solar 2.0 program would use their on-site generated energy when it is simultaneously consumed at a customer's house. When a customer's PV system is generating more than the house is consuming, the customer is paid the full

value of the generation “sold” to the grid at the utility’s buy-back rate. When a house receives more energy from the grid than its PV system is generating (such as at night), the customer pays the retail rate for that energy to pay their fair share of utility costs when they take power from the grid.

### **Consumption and buy-back rates**

A Roseville Solar 2.0 customer will be charged for energy sent to their house from the grid at the standard retail energy rate in effect for each monthly billing period.

A Roseville Solar 2.0 customer will be credited for energy sent to the grid from their house at the utility’s buy-back rate in effect for each monthly billing period. The expected value of the energy sent by the customer to the grid is **5.98** cents per kilowatt-hour (kWh). The buy-back credit compensates the customer for the value of the energy sent to the grid and the value of other avoided costs. The value of each component of the buy-back rate in 2018 is shown below in Figure 2.

<b>Component</b>	<b>\$/kWh</b>
<b>Energy</b>	<b>\$0.0387</b>
<b>System Capacity</b>	<b>\$0.0158</b>
<b>Renewable energy</b>	<b>\$0.0033</b>
<b>Transmission</b>	<b>\$0.0013</b>
<b>Line Losses</b>	<b>\$0.0006</b>
<b>Total Buy-back Rate</b>	<b>\$0.0598</b>

### Utility bills in Roseville Solar 2.0

Customers in the new program will see an additional line item on their monthly utility bills. The extra line will show the quantity of energy sent by the customer to the grid, along with the corresponding buy-back rate, and the calculated credit. In the simplified bill samples below, the different types of customers' electric line items and their associated charges and credits are all based on a typical house using 800 kWh per month.

### Sample non-solar residential bill detail

	Cost
Base charge	\$26.00
Energy charge	\$80.00
<b>Total</b>	<b>\$106.00</b>

### House with large PV system

#### Sample NEM bill

	Cost
Base charge	\$26.00
Energy charge	\$0.00
<b>Total</b>	<b>\$26.00</b>

#### Sample Roseville Solar 2.0 bill

	Cost
Base charge	\$26.00
Energy charge	\$53.00
Buyback credit	(\$29.00)
<b>Total</b>	<b>\$50.00</b>

### House with typical PV system

#### Sample NEM bill

	Cost
Base charge	\$26.00
Energy charge	\$61.00
<b>Total</b>	<b>\$87.00</b>

#### Sample Roseville Solar 2.0 bill

	Cost
Base charge	\$26.00
Energy charge	\$68.00
Buyback credit	(\$4.00)
<b>Total</b>	<b>\$90.00</b>

### Metering and technology impacts

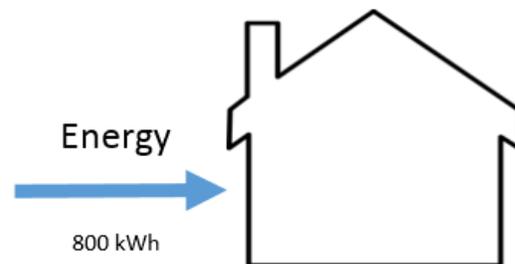
Implementation of the Roseville Solar 2.0 program requires modifications to current business systems, customer bills, and electric meters. Traditional electric customers have a meter that reads energy consumed at a house. Current NEM customers have an upgraded meter that reads the net energy moving to and from a house. A future solar customer will have a meter capable of separately measuring and recording energy moving to and from a house. Please refer to Figure 3 below.

Figure 3.

### Traditional, NEM, & Roseville Solar 2.0 Billing Methods

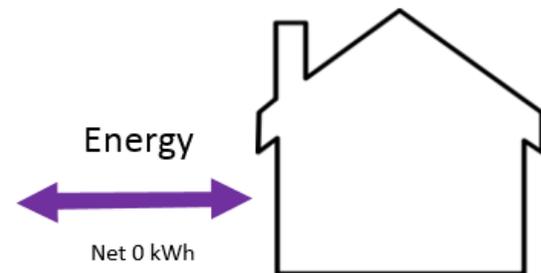
#### Traditional non-PV house

- Energy into the house is metered with one directional register
- Energy (typical 800 kWh/month) is billed using the residential rate schedule



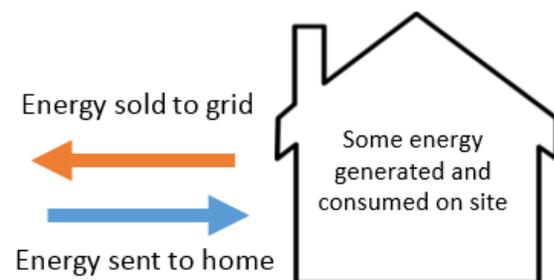
#### Net Energy Metering

- Meter has one bi-directional register that rolls forward and backward
- NEM PV system often sized to match annual energy use of house



#### Roseville Solar 2.0

- Meter has two registers each running in one direction
- Energy generated and consumed on site is not measured by meter
- Energy sold by customer to the grid credited at the buyback rate
- Energy delivered to customer charged using standard residential rate



### **Grandfathering existing customers for up to 20 years**

The Roseville Solar 2.0 program will grandfather customers with systems installed within the NEM cap, prior to October 2018. The 20-year transition or grandfathering period starts from the time of interconnection for all customers who install solar by October 2018.

Customers interconnected more than 10 years as of October 2018, will receive 10 full years under the original NEM program (until October 2028). In addition, existing NEM customers may expand their systems by up to 10% of the original system size and will remain eligible for the original NEM program after October 2018. Customers who expand their system prior to October 2018 and sign a new interconnection agreement will be eligible for the 20 year grandfathered program from the new interconnection date.

### **Utility bills and systems impacts**

Implementation of Roseville Solar 2.0 requires modifications to current business systems and processes including purchasing and installing bidirectional electric meters, programming of meter reading devices, training meter reading staff, modifying the format of utility bills, and revising electric usage billing calculations. Modifications to systems and processes are planned to utilize existing staff and budgeted resources.

### **Customer and Policy Impacts**

The Roseville Solar 2.0 program will support continued solar PV deployment while better aligning the City's electric rates with the cost of providing service. Fulfilling Roseville's NEM legislative requirements and adopting the proposed NEM successor program are consistent with the California Public Utilities Code, state constitutional requirements regarding cost-based rates, and the City Council goal of sound and stable utilities.

### **Summary**

Solar Roseville 2.0 will provide:

- Longer term view of the costs and benefits for those interested in installing rooftop solar PV after the current NEM cap has been reached,
- Fairer and more equitable cost allocation for all customers,
- Grandfathering for existing solar customers,
- Consistency with City Council goals, priorities and policies, and
- Consistency with state requirements regarding cost-based rates for municipalities.

## **Solar Energy and Net Metering**

## **Edison Electric Institute**

### **What Is Net Metering?**

Net metering is a billing system that allows electric customers to sell to their electric utility any excess electricity generated by their DG (distributed generation) systems. Many different DG sources may be eligible for net metering credits, but rooftop solar installations are the most common type of DG promoted with net metering.

While net metering policies vary by state, customers with rooftop solar or other DG systems usually are credited at the full retail electricity rate for any electricity they sell to electric utilities via the grid. The full retail electricity rate includes not only the cost of the power but also all of the fixed costs of the poles, wires, meters, advanced technologies, and other infrastructure that make the electric grid safe, reliable, and able to accommodate solar panels or other DG systems. Through the credit or payment they receive, net-metered customers effectively avoid paying these costs for the grid.

### **Do Customers With DG Systems Still Use the Power Grid?**

Yes. Unlike other energy sources, electricity has unique properties that do not allow it to be easily or economically stored—it must be generated and delivered at the precise moment it is needed. Rooftop solar, like all solar, relies on the availability of the sun to generate electricity. The sun does not shine around the clock, and solar power can appear or disappear rapidly over the course of a day. Because the majority of residential DG customers do not have storage on their systems, they require a connection to the grid. The grid connection enables residential rooftop solar users to buy power when their system does not produce enough electricity to meet their needs and to sell electricity onto the grid if their system generates more than they need. Customers with DG systems also rely on the grid to ensure that their own power supply provides reliable, high-quality service at all times.

### **How Does Net Metering Impact Customer Bills?**

Customer electric bills are based on the electric utility's cost of providing electric service. This includes the cost of the fuels used to generate electricity and the cost to transport and deliver the electricity to the customer. Costs also include the maintenance of the grid, as well as utility programs for low-income assistance, energy efficiency, environmental improvements, and other public benefits.

In general, every electric customer has an electric meter that records the amount of power delivered by their electric utility. As electricity is used, the meter spins forward, much like a car's odometer records miles traveled. In the case of an electric meter, the meter records energy use in kilowatt-hours (kWh).

Net-metered customers generally are credited for the electricity they sell to the grid, with their electric meter essentially spinning backwards to provide a credit against the electricity that these customers must buy from their electric utility at night or during other periods when their electricity use exceeds their system's output. Customers are only billed for their "net" energy use.

## **Solar Energy and Net Metering**

## **Edison Electric Institute**

That means that when rooftop solar or other DG customers generate electricity, they avoid paying for the utility's power, which is fair because they did not use it. But, they also avoid paying for all of the fixed costs of the grid that delivers power when they need it and/or takes the excess power they sell back to the utility.

As a result, these grid costs are shifted to those customers without rooftop solar or other DG systems through higher utility bills, which is not fair.

### **What Is the Difference Between Retail and Wholesale Electricity Rates?**

Retail electricity rates are the final rates charged to customers by an electric utility, based on all of the costs involved in generating, transporting, and delivering power.

Wholesale electricity rates include the cost of the fuel used to generate electricity and the cost of buying the power in the competitive wholesale market from any number of electricity providers. They do not include the cost of transporting and delivering the electricity through the electric grid to reach a customer. Wholesale prices usually change on an hourly basis throughout the day.

Because of the way that net metering policies originally were designed, net-metered customers are credited for the power they sell to electric utilities, usually at the full retail electricity rate, even though it would cost less for utilities to produce the electricity themselves or to buy the power on the wholesale market from other electricity providers.

Many energy experts agree that net-metered customers should be compensated at the wholesale price for the electricity they produce, similar to other electricity providers. This reflects the fact that electric utilities buying this power still must incur the costs of delivering the power to their customers, including the costs of maintaining the poles, wires, meters, and other infrastructure required to deliver a reliable supply of electricity.

### **How Does Distributed Generation Affect the Grid?**

As the use of rooftop solar and other DG systems increases, so, too, does the two-way flow of power on the electric distribution system. To ensure the safe and reliable delivery of electricity, an electric utility's distribution system must be able to safely manage and control the flow of two-way power.

At the same time, electric utilities face integration challenges associated with the fluctuating levels of power created by variable wind and solar DG systems.

Electric utilities must invest in their distribution systems to avoid overloading circuits, causing voltage regulation or power quality problems, or jeopardizing the safety of the public or utility employees. However, if net-metered customers do not contribute to the fixed costs of maintaining the grid and keeping it operating reliably, a utility's remaining customers will face higher rates to pay for these costs.

## **Should Current Net Metering Policies Be Updated?**

Yes. For one thing, the costs of producing solar power have declined substantially since the net metering concept was first introduced, but the financial benefits of net metering have not been adjusted to reflect this.

Read the full article at:

<http://www.eei.org/issuesandpolicy/generation/NetMetering/Documents/Straight%20Talk%20About%20Net%20Metering.pdf>