



Center for  
**Sustainable Energy**<sup>®</sup>  
CALIFORNIA

# **Virtual Net Metering and Solar PV Economics in Affordable Housing**

*Affordability Through Sustainability Workshop*

*San Diego, CA*

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California Center for Sustainable Energy



# Center for Sustainable Energy CALIFORNIA



## *Our Core Activities:*

- Incentive Program Administration
  - Energy Efficiency
  - Distributed Energy Resources
  - Clean Transportation
- Sustainable Energy Education and Outreach
- Energy Policy and Planning
- Research and Consulting Services

# Presentation Overview

1. Update: CSI, MASH, and MF SWH Incentives
2. Virtual Net Metering
3. Solar PV Economics in Affordable Housing

# Presentation Overview

- 1. Update: CSI, MASH, and MF SWH Incentives**
2. Virtual Net Metering
3. Solar Electric PV Economics in Affordable Housing

# California Solar Initiative

## Programs:

- Low Income
  - Multifamily Solar Affordable Housing (MASH)
  - Single Family Affordable Housing (SASH)
- CSI General Market
- CSI Thermal- Solar Water Heating

# MASH Program and Update

Began in 2009

Incentives for Solar PV on *Existing* MF Affordable Housing

Incentives:

	<b>Common Areas</b>	<b>Tenant Load</b>
Was:	\$3.30 per Watt	\$4.00 per Watt
<b>Recently Changed to:</b>	<b>\$1.90 per Watt</b>	<b>\$2.80 per Watt</b>

(Solar Costs about \$7.00- \$8.00 per Watt)

- Incentives fully subscribed
- Waitlist is open but oversubscribed

# California Solar Initiative (CSI)

Step	Statewide MW in Step	EPBB Payments (per Watt)		
		Residential	Non-Residential	
			Commercial	Government/ Non-Profit
1				
2				
3				
4				
5				
6				
7				
8				
9	285	\$0.25	\$0.25	\$0.90
10	350	\$0.20	\$0.20	\$0.70

Updated information available at: [www.csi-trigger.com](http://www.csi-trigger.com)

# CSI Thermal Solar Water Heating

2010 start, \$168 million for Multifamily /Commercial

Current rebate amounts are at their highest (Step 1)

- Incentive typically covers 30% of project cost

Maximum Incentives for Multifamily/Commercial projects:

- \$500,000 for natural gas-displacing systems
- \$250,000 for electric-displacing systems

Low-Income Program

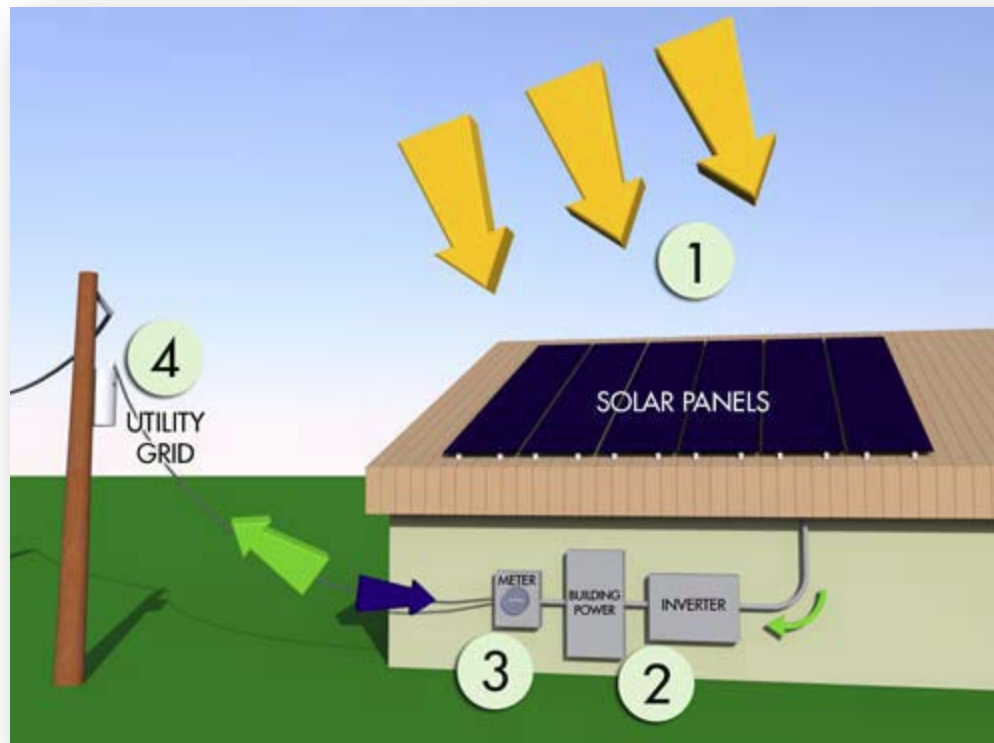
- Coming soon ~ 3 months
- Funds \$25 million in rebates for low-income solar water heating projects
- Rebates will be 2x higher for Multifamily/Commercial

# Presentation Overview

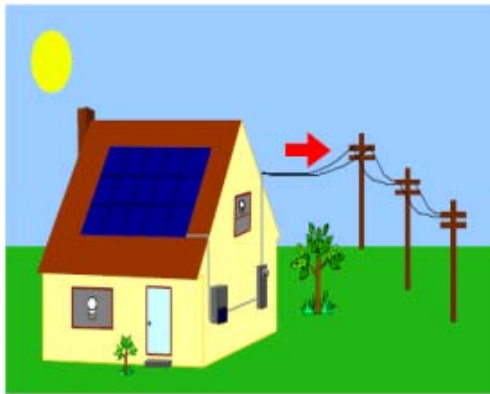
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# What is Net Metering?

- Net metering is a method of “banking” excess electricity credits.



# How does Net Metering work?



-Producing more than consuming  
(spinning the meter backwards)



-Consuming more than producing  
(spinning the meter forward)

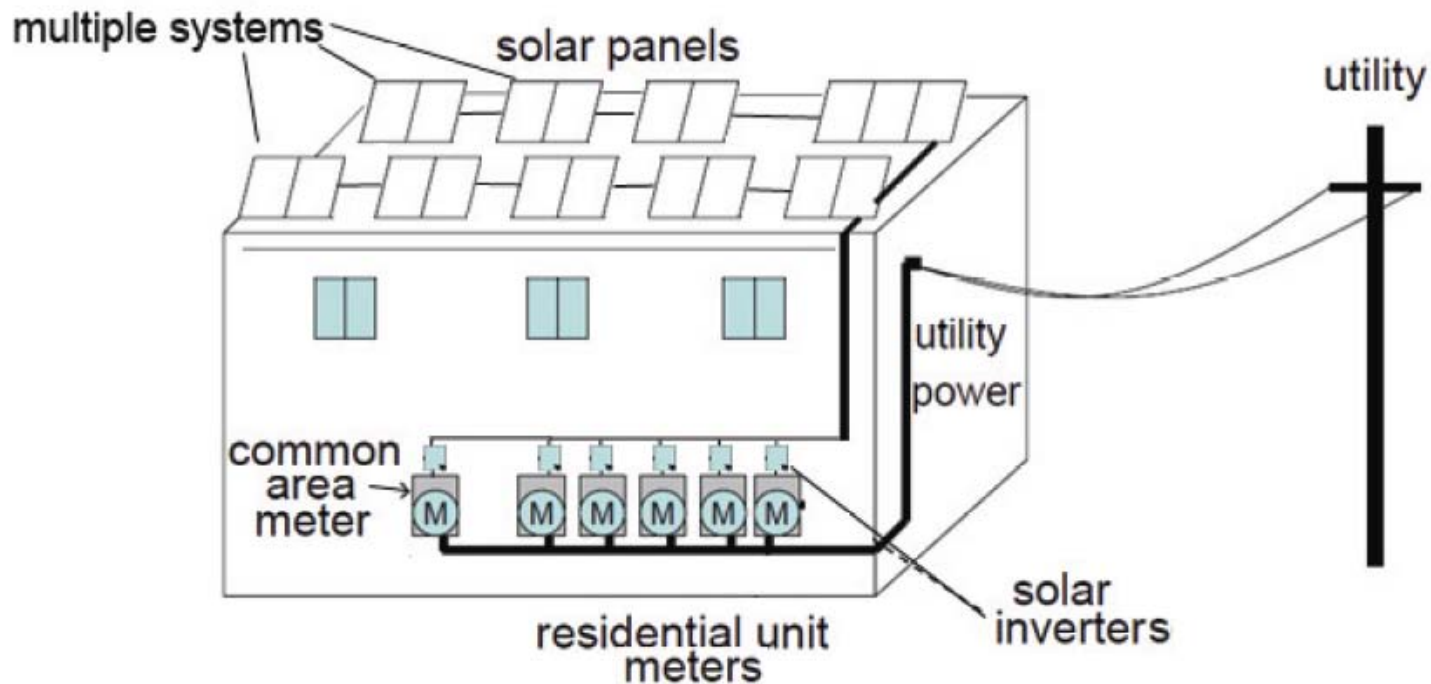
# Virtual Net Metering



**Simply a way to distribute solar  
generation credits from a single  
PV system mathematically  
(virtually) across multiple meters**

# Without Virtual Net Metering

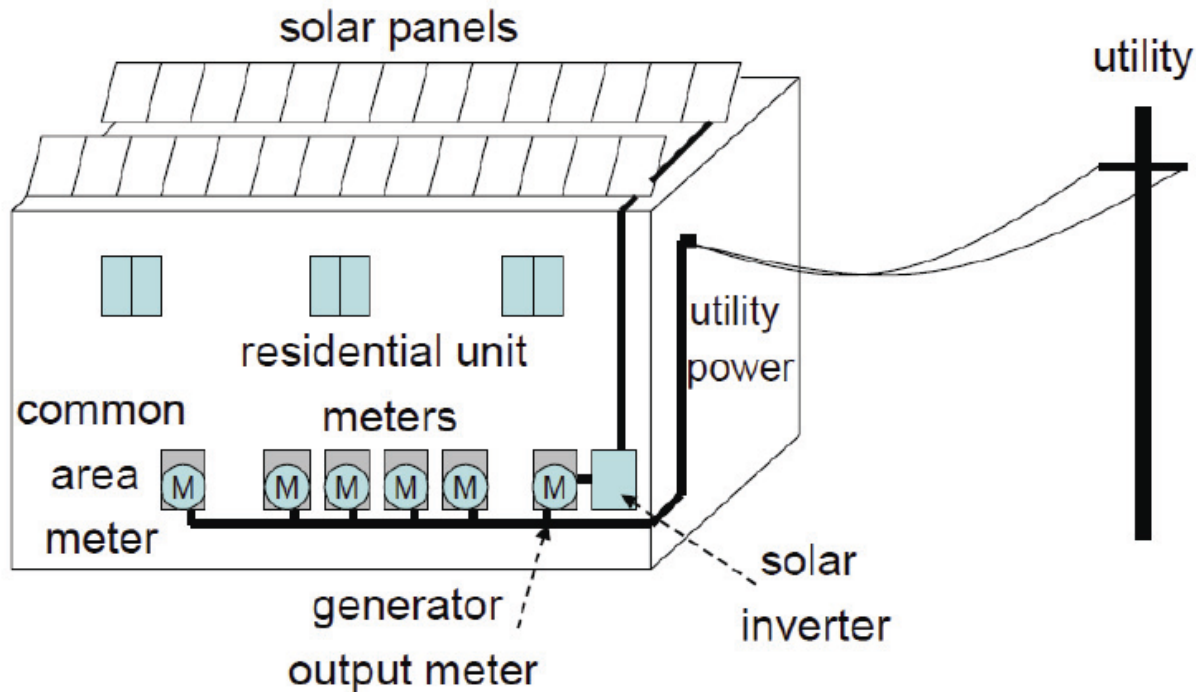
solar generator



Source: CA Public Utilities Commission (CPUC)

# With Virtual Net Metering

solar generator

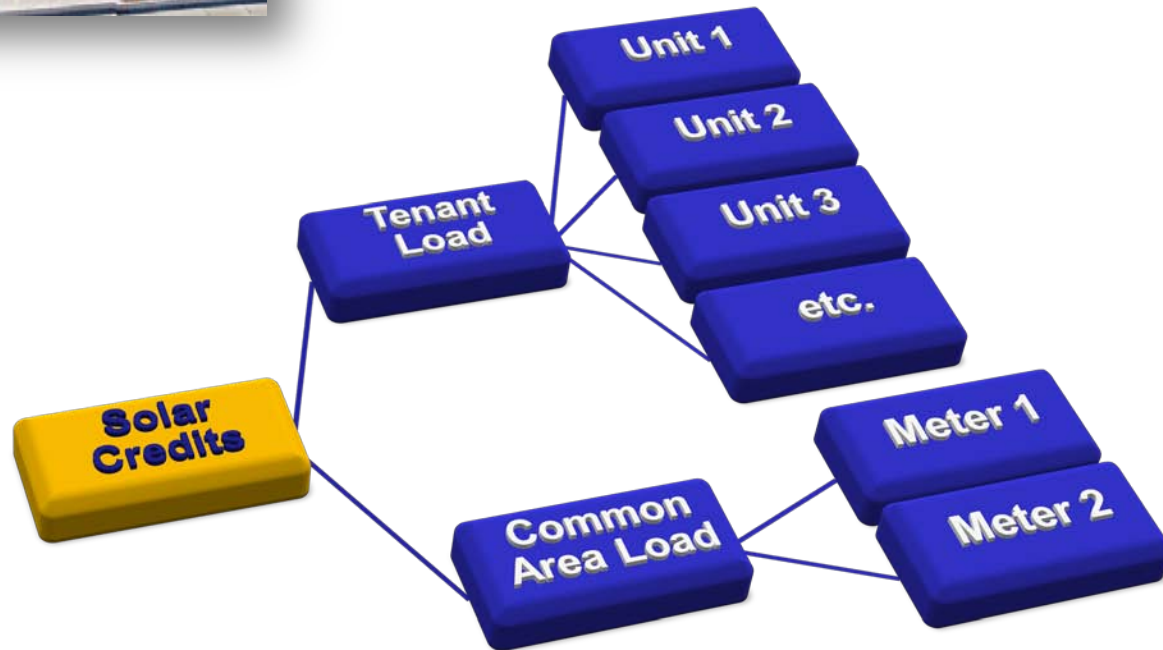


Source: CA Public Utilities Commission (CPUC)

# Virtual Net Metering



Los Vecinos, Chula Vista  
Wakeland HDC  
Source: [http:// www.wakelandhdc.com/](http://www.wakelandhdc.com/)

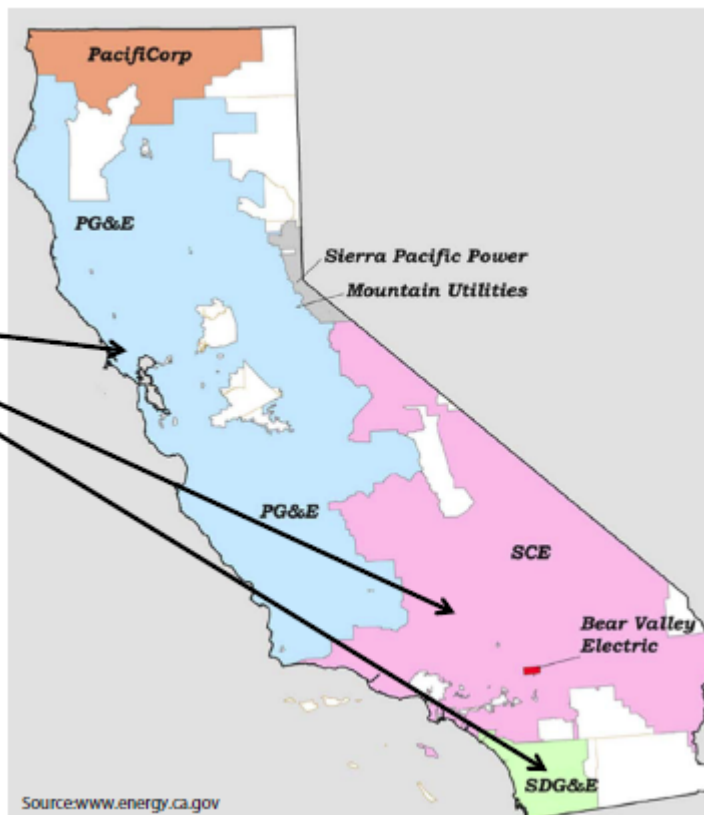


# Virtual Net Metering

Initially only available to MF affordable housing complexes that received incentives

Now available to all multi-tenant buildings

Available to customers in PG&E, SCE and SDG&E territories



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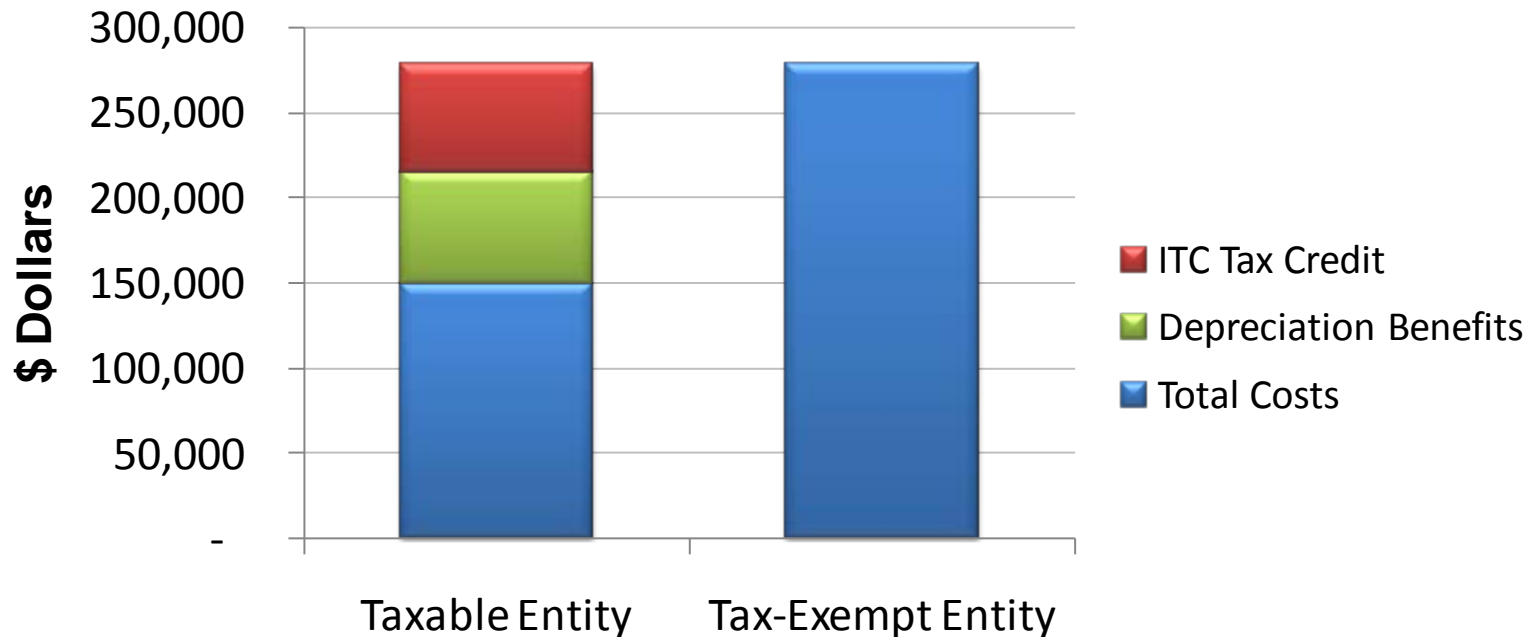
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## Distributed Solar PV Economics

**Bill Savings +  
Incentives +  
Tax Benefits +  
Other Benefits**      **> Costs?**

# Tax Benefits

## 30 kW-DC System at \$7/Watt-AC



## Distributed Solar PV Economics

**Bill Savings +  
Incentives +  
Tax Benefits +  
Other Benefits**

**> Costs?**

**Upfront  
Capital  
Outlay**



**Solar  
Lease  
or PPA**



## PPAs - Leases

- Tax equity investor owns the system and uses tax savings
- Customer pays a \$/kWh rate or a set monthly fee to a PPA provider
- Benefits:
  - Enables tax-exempt entity to utilize solar's tax benefits
  - Reduces upfront costs, generally PV performance and O&M is performed by the PPA provider

# Distributed Solar PV Economics

**Bill Savings > Costs?**

# Solar PV Retrofits in Multifamily Affordable Housing

## Impacts of Virtual Net Metering and MASH Incentives on Project Economics

Melanie McCutchan Timothy Treadwell Jon Fortune Jeremy Del Real

July 28, 2011<sup>1</sup>

**Study Available at:**

<https://energycenter.org/index.php/incentive-programs/multifamily-affordable-solar-housing>



# VNM/Solar Economics Study

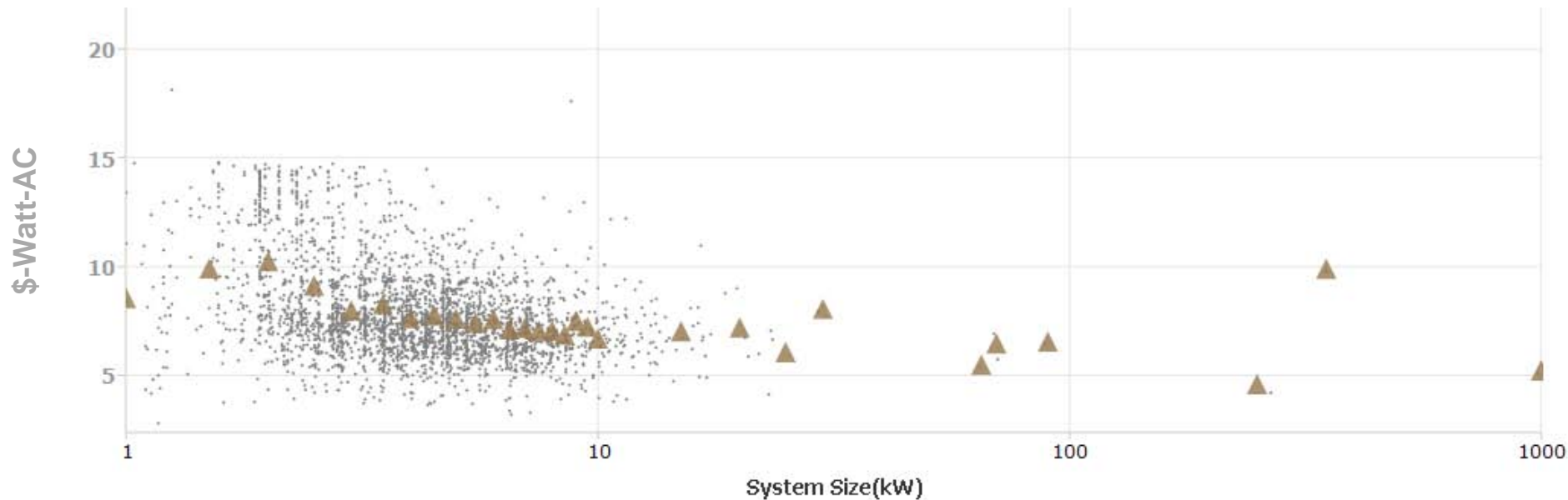
- Four study sites in City of San Diego
- Cash flow model
  - PV cost versus bill savings at the study sites
    - Common area loads
    - Tenant Loads
  - PV cost compared to CA utility rates
    - Commercial
    - Low income residential

# Distributed Solar PV Economics

Bill Savings  $>$  Costs?

# Solar Costs, 2011

in \$/Watt-AC Installed by System Size



**Typical: ~7-8/Watt-AC**

4,397 application(s) were included for the generation of this chart.

**Source: [www.californiasolarstatistics.ca.gov](http://www.californiasolarstatistics.ca.gov)**

# Solar Costs

in cents/kWh\*

$$\text{Cost of Energy} = \frac{\text{Total Capital and O\&M Costs}}{\text{Total kWhs Produced}}$$

# Solar Costs

in cents/kWh\*

## Without Incentive

- W/Tax Benefits: 16-25 ¢/kWh
- W/o Tax Benefits 32-43 ¢/kWh

## With MASH or NSHP Incentives

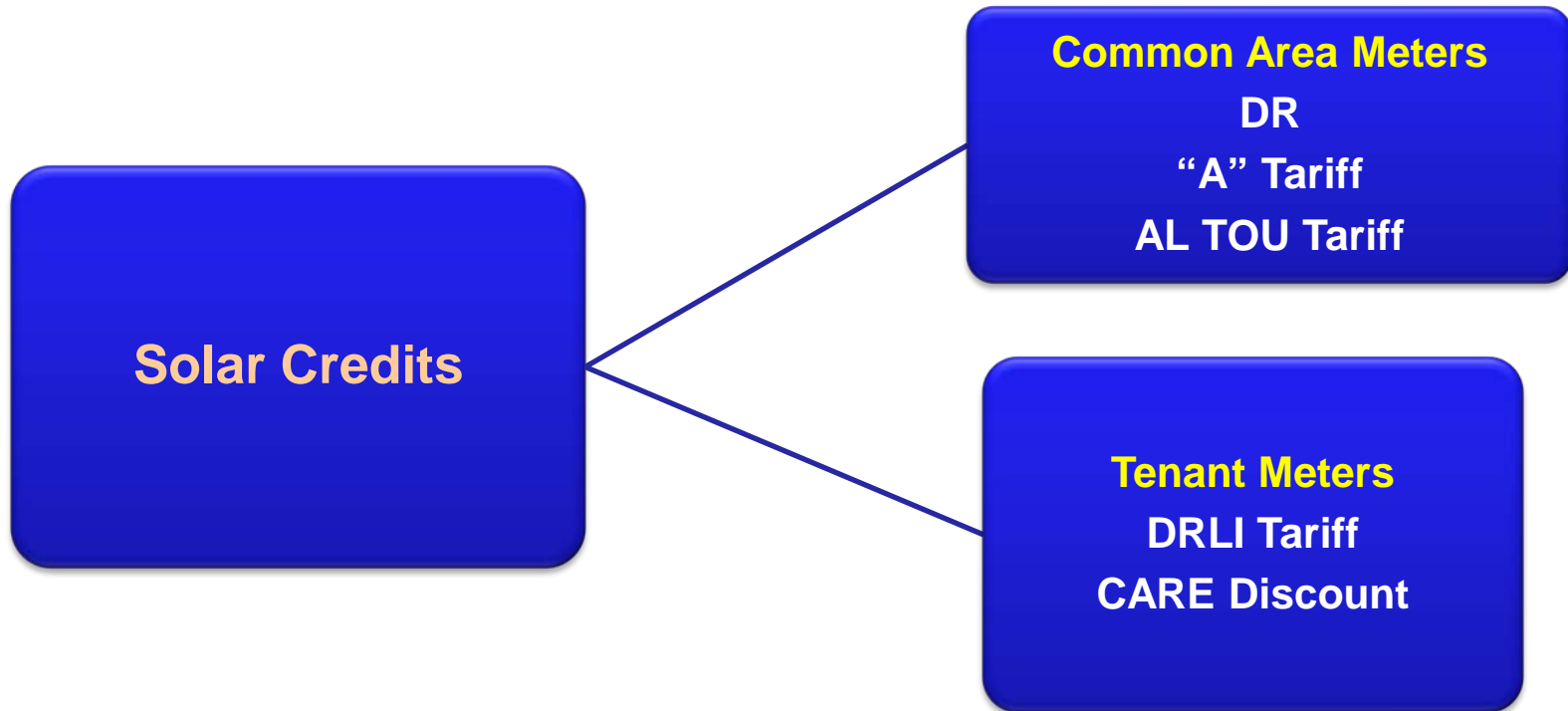
- W/Tax Benefits: 7-16 ¢/kWh
- W/o Tax Benefits 22-32 ¢/kWh

\*Assumes ~\$7/Watt-AC, 21% Capacity factor, 8% discount rate for taxable entity, 5% discount rate for tax-exempt entity, PV degradation at 0.5 % per year

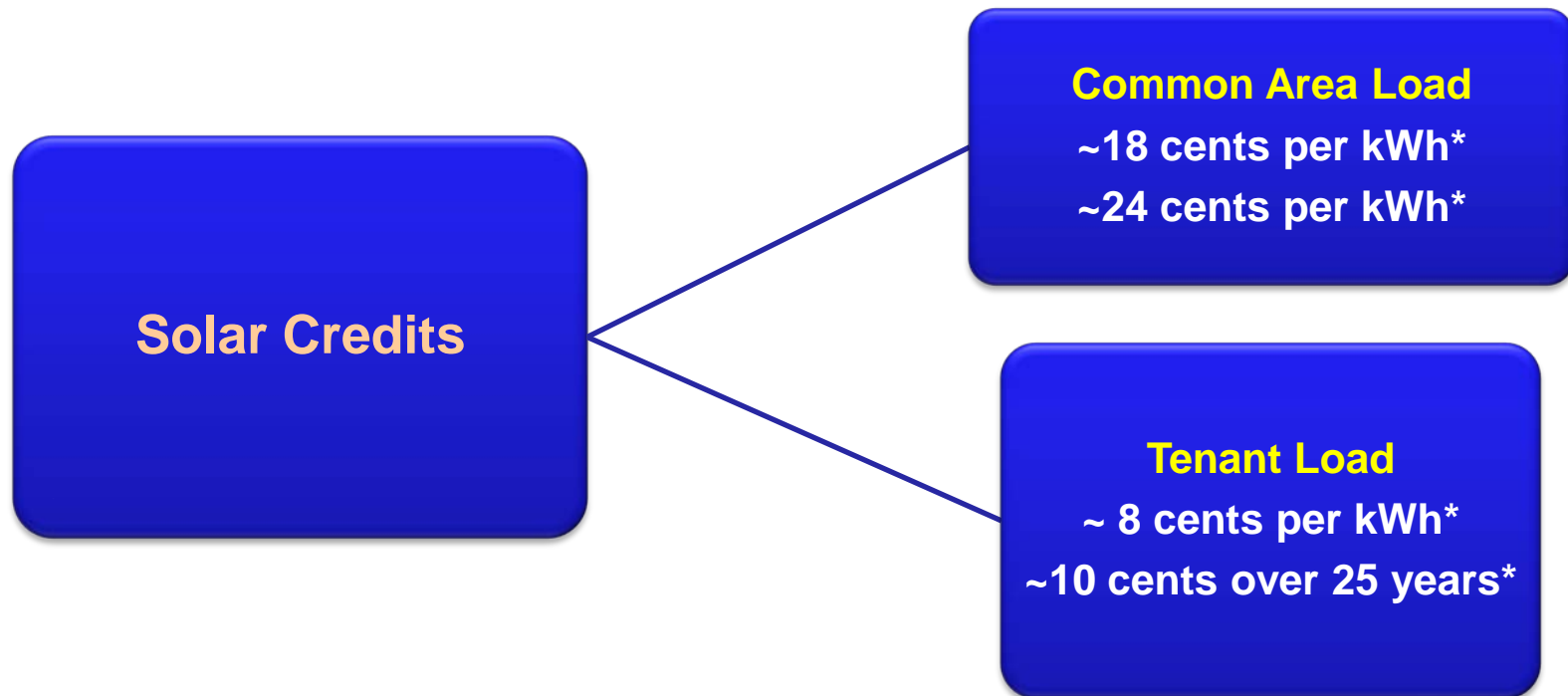
# Distributed Solar PV Economics

**Bill Savings** > Costs?

# SDG&E Tariffs



# Bill Savings on SDG&E Tariffs



\*Actual Bill Savings may vary significantly by common area and tenant meters depending on electricity usage and tariff

# Distributed Solar PV Economics

**Bill Savings > Costs?**

## Costs (¢/kWh) vs. Bill Savings

### Costs without Incentive:

- W/Tax Benefits: 16-25
- W/o Tax Benefits: 32-43

### Costs with MASH or NSHP Incentives

- W/Tax Benefits: 7-16
- W/o Tax Benefits: 22-32

#### Common Area Load

~18 ¢/kWh\*

~24 ¢/kWh over 25 years\*

#### Tenant Load

~ 8 (¢/kWh)\*

~10 (¢/kWh) over 25  
years\*

**\*Actual Bill Savings may vary significantly by common area and tenant meters depending on electricity usage and tariff**

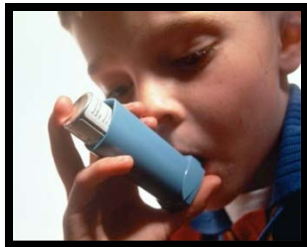
# Other Project Economic Benefits

- Stabilized Energy Costs
- Increased Property Value



# Societal Benefits

- Job Creation/Education
- Environmental



# Thank you for your attention

Feel free to contact me:

Melanie McCutchan

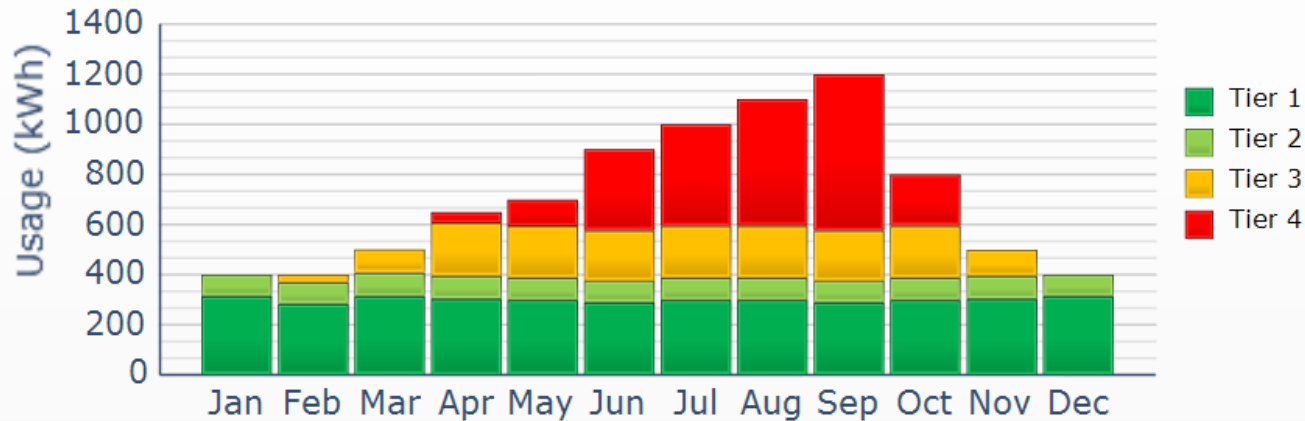
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# Offsetting Tenant Load SDG&E Territory



Tariff: DR

DR-LI

Energy Usage	Tier	Summer	Winter	Summer	Winter
Baseline	1	\$0.13	\$0.13	\$0.13	\$0.13
100-130% of Baseline	2	\$0.15	\$0.15	\$0.15	\$0.15
130- 200% of Baseline	3	\$0.28	\$0.27	\$0.22	\$0.21
Over 200% of Baseline	4	\$0.30	\$0.29	\$0.22	\$0.21

# Solar PV Incentives

## Solar Incentives

	<i>Existing Buildings</i>		<i>New Construction</i>
	<i>MASH</i>	<i>CSI</i>	<i>NSHP</i>
Common Area Load	\$1.90/Watt -AC	\$0.25/Watt -AC	\$2.97/Watt -AC
Tenant Load	\$2.80/Watt -AC	\$0.25/Watt -AC	\$3.15/Watt -AC