




# **Webinar: Solar System Life Maintenance**

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**Garen Grigoryan**  
Business Analyst  
Solar & Customer Generation  
Pacific Gas & Electric Co.



# Goal & Agenda

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## Goal

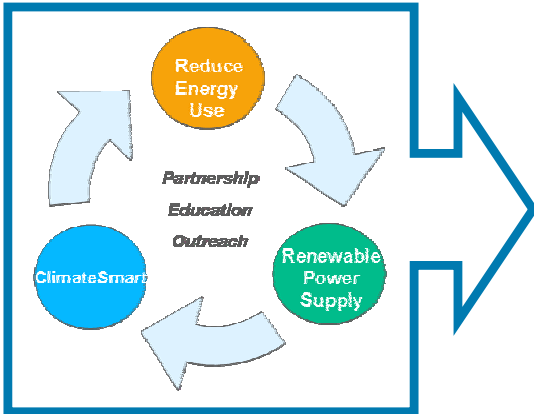
Provide information on certain steps one may take to maximize the solar system's life and output in order to make the most of one's investment.

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## Agenda

- Energy Efficiency (EE) before PV
- Value of Performance Monitoring Reporting Service (PMRS)
- Understanding Your Warranty
- PV Module Maintenance
- PV Inverter Maintenance
- Quick Tips
- Q&A

# Integration of EE and PV



EE should be implemented prior to PV

Why?

- EE is typically much more **cost-effective** than PV
- **California's loading order** stipulates that EE be implemented prior to PV
- Decreasing a facility's consumption with EE reduces the size – **and cost** – of the PV system necessary to offset the facility's load

Inquire about  
EE before  
installing PV

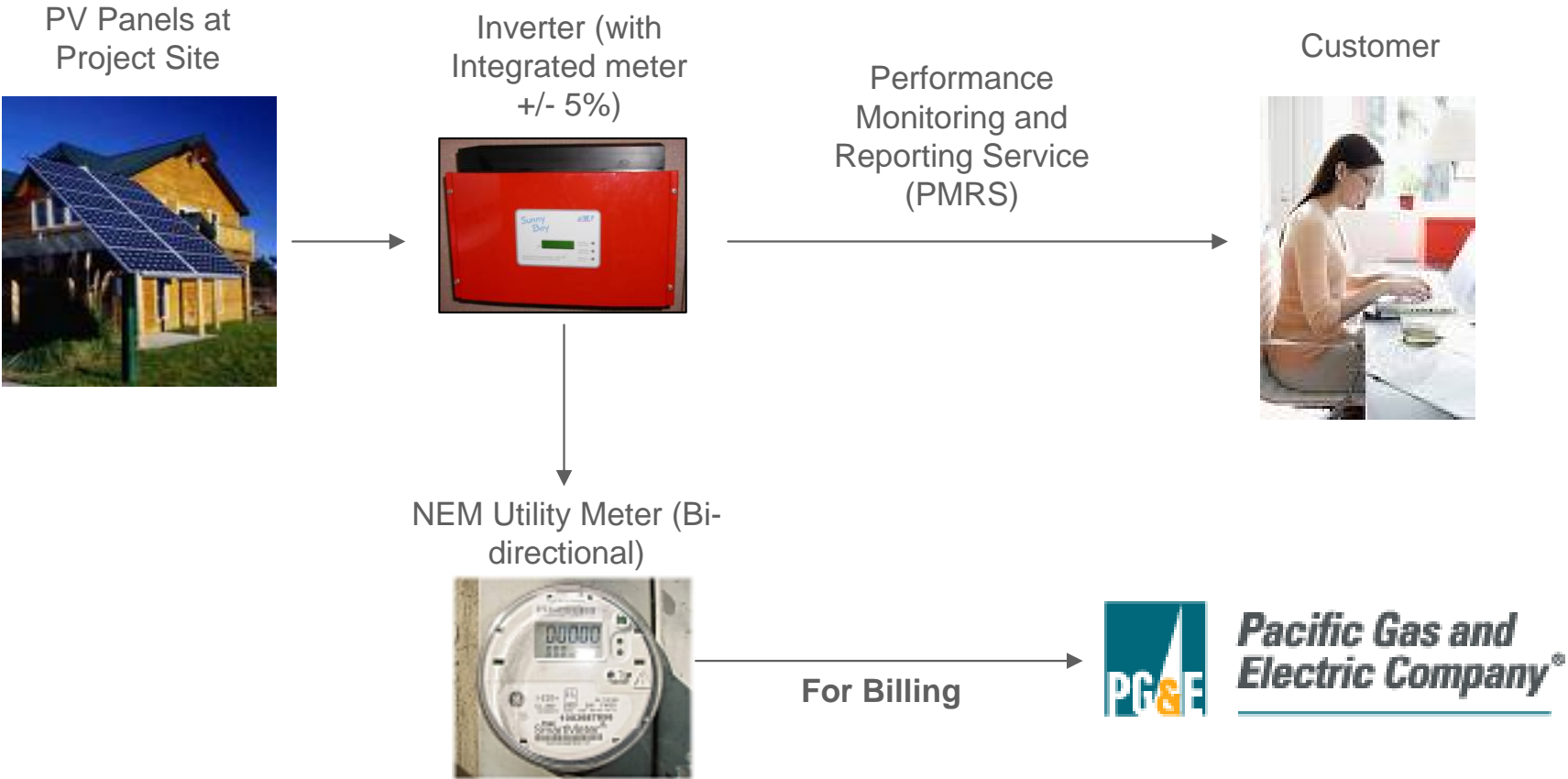


# Performance Monitoring and Reporting Service - PMRS

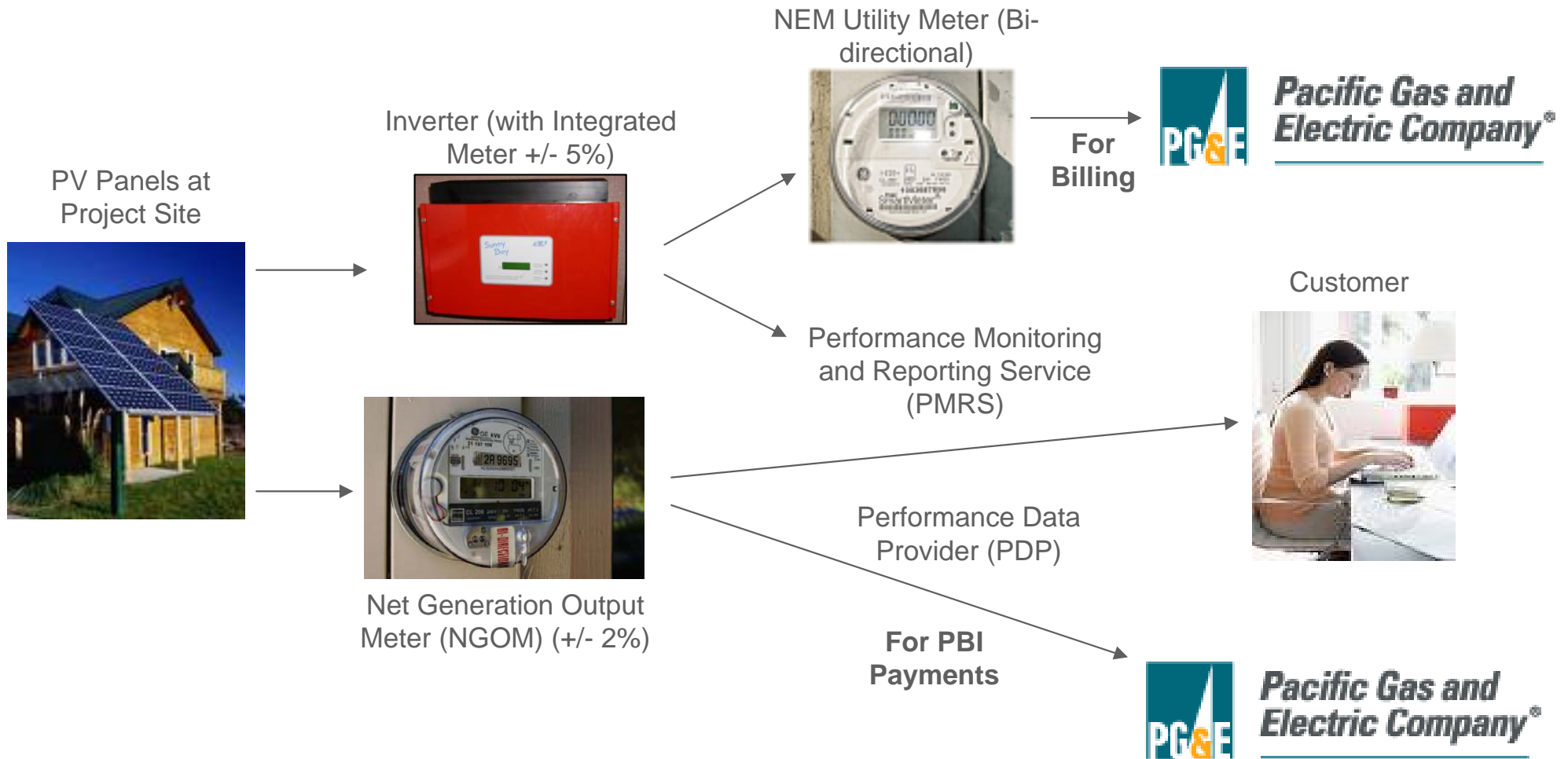
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- Service that provides system performance information and/or alerts to customers
- Required for eligibility under the California Solar Initiative (CSI) Program
  - Exempt for some Expected Performance Based Buydown (EPBB) customers if over the cost cap
  - Required for Performance Based Incentive (PBI) customers
- PMRS meters and providers must be listed by the CEC to be eligible
- Inverter integrated or stand-alone meter

# Typical EPBB Metering and Monitoring System



# Typical PBI Metering and Monitoring System



# PV Monitoring – How it Works

- Wireless communication of data – primarily for residential
- Inverter company or 3rd party hosts website
- Customer can view system from home or remotely



*Can cost extra but some companies are offering it as standard package.*

# Value of Performance Monitoring

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- Real time monitoring and alerts
  - Simple web based views
  - Downloadable data for consumption
- Tracking of power production and usage, both real time and historical data
- Reduce long term operations and maintenance costs
- Optimize energy production
  - Increase return on investment (ROI)

# Understanding Your Warranty

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- CSI Requirement
  - Solar systems must have a minimum 10 year warranty both from the panel manufacturer and the contractor performing the work
    - Cover solar generating system only (PV modules and inverters)
    - Must include no-cost repair and replacement and any associated labor to the customer
- Warranty ensures that the solar system produces the target amount of electricity
  - Achieve energy production levels
- Systems should be monitored to ensure a long operating life

# Warranty for PV Modules and Inverters

	PV Modules	Inverters
Warranty Period	<ul style="list-style-type: none"><li>• 20 - 25 year limited warranty</li></ul>	<ul style="list-style-type: none"><li>• 5 – 10 year limited warranty</li></ul>
Details	<ul style="list-style-type: none"><li>✓ 1-10 years for material defect and workmanship</li><li>✓ First 12 years at 90% minimum power output*</li><li>✓ Within 25 years at 80% minimum power output*</li></ul>	<ul style="list-style-type: none"><li>✓ Repair and replacement of defective components</li></ul>

\*This is an example of SunPower PV panel warranty and should not be construed as standard for all manufacturers. Please check with your Solar Contractor for details on panel warranties

# PV Module Maintenance

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- Maintenance is easy
  - No moving parts (typical for most residential)
- Probable lifetime 25 years or more
- Accumulation of dirt on solar modules (“soiling”) can have a significant impact on performance
  - One of the largest losses under the control of the Owner
- Factors affecting soiling
  - Rainy / dry seasons
  - Dust from dirt roads or agricultural facilities
  - Close to road surface of busy street
  - Soot from airport flight path
  - Bird waste

# PV Module Maintenance – Cont'd

- Estimated degradation of PV modules due to soiling
  - Washed as often as necessary ~ 1.0
  - Washed once in July ~ 0.96
  - Never washed ~ 0.93
- Economics of system cleaning need to be taken into consideration
  - Cost of cleaning vs. production (kWh)
  - Differs by region and environment



**Bottom line: Washing panels helps, but is not crucial unless area is particularly dusty or there are other unusual factors (birds).**

# Inverter Maintenance

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- Maintenance is easy
  - No moving parts
- Probable lifetime 15 years or more
- Trend in electronics is to get smaller and cheaper
- Items to check for
  - Inspect air duct and external cooling fans
  - Ensure fans are operating
  - Check wiring
  - Check output of inverter vs. expected production



# Quick Tips

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- Perform EE audit and implement measures
  - No Cost
  - Low Cost
  - Investment
- Contact PV consultants or vendors
- Always solicit bids from multiple vendors
- Evaluate proposals comparing to Solar Calculators
- Inquire and understand your warranties before installing PV system
- Consider your financial options
- Inspect PV system periodically

# Information Resources

Applicable Technology	Resource Type	Resource	Link
PV	California PV resources <ul style="list-style-type: none"> <li>• Eligible equipment list</li> <li>• Certified PV contractors</li> </ul>	Go Solar California website	<a href="http://www.gosolarcalifornia.org/">www.gosolarcalifornia.org/</a>
	PV incentives	PG&E's California Solar Initiative website	<a href="http://www.pge.com/csi">www.pge.com/csi</a>
	Current CSI incentive rate	CSI Trigger Point Tracker	<a href="http://www.csi-trigger.com/">www.csi-trigger.com/</a>
	PV calculator	Clean Power Estimator website	<a href="http://www.consumerenergycenter.org/renewables/estimator/index.html">www.consumerenergycenter.org/renewables/estimator/index.html</a>
	Energy efficiency info	PG&E's energy efficiency website (rebates, audits, etc.)	<a href="http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/">www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/</a>
	Other financial opportunities for renewable energy projects (CA and federal)	Database of State Incentives for Renewables & Efficiency	<a href="http://www.dsireusa.org/">www.dsireusa.org/</a>

# Questions?