

California Energy Commission

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# Bioenergy in California

**Karen Khamou**  
**Manager, Renewable Energy Policy**  
**Energy Procurement**  
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## Outline

- RPS Compliance: Past, Present, and Future
- Procurement Opportunities for Bioenergy
- Challenges to Bioenergy Deployment



# PG&E's Mission is to Provide Safe, Reliable and Affordable Energy to Northern & Central California



## Company Facts

- Fortune 200 company located in San Francisco, CA
- 20,000+ employees

## Energy Supply

- Serves 15M people:
  - 5.2M electric accounts
  - 4.3M natural gas accounts
- Peak electricity demand: 20,000 MW

## Service Territory

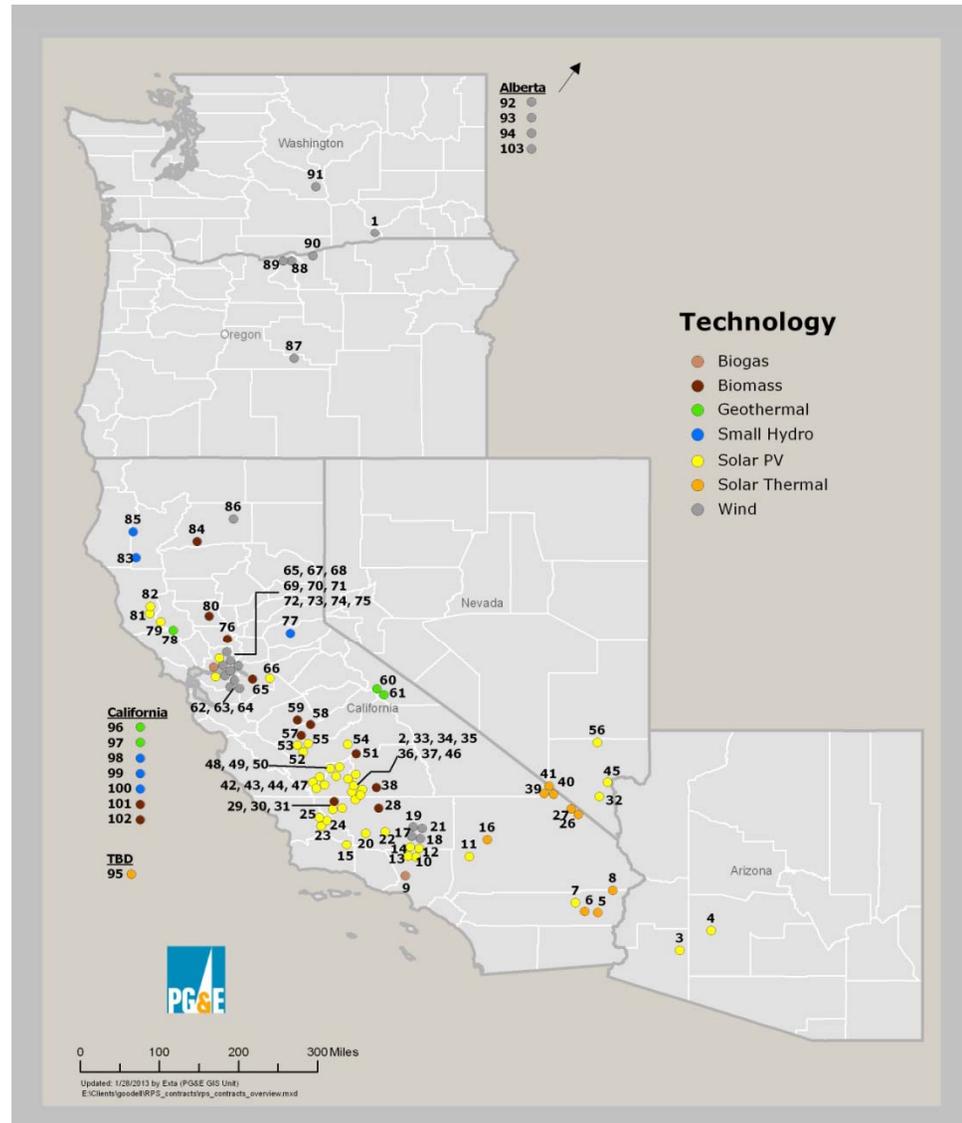
- 70,000 sq. miles across the California landscape
- 160,000 circuit miles of electric transmission and distribution lines
- 49,000 miles of natural gas transmission and distribution pipelines



# Executed RPS Contracts (excluding Feed-in Tariff contracts)

141 RPS contracts totaling over 10,400 MWs, since the program began in 2002<sup>(1,2)</sup>

Technology	#	MW
Bioenergy	23	351
Geothermal	10	769
Small Hydro	8	146
Solar PV	45	2,929
Solar Thermal	14	2,755
Wind	40	3,467
Wave	1	2
<b>Total</b>	<b>141</b>	<b>10,418</b>



<sup>1</sup>Table does not include small (less than 1.5 MW) renewable generator PPAs and 5 amended post-2002 Qualifying Facility contracts (QF contracts total MW = 56 MW)

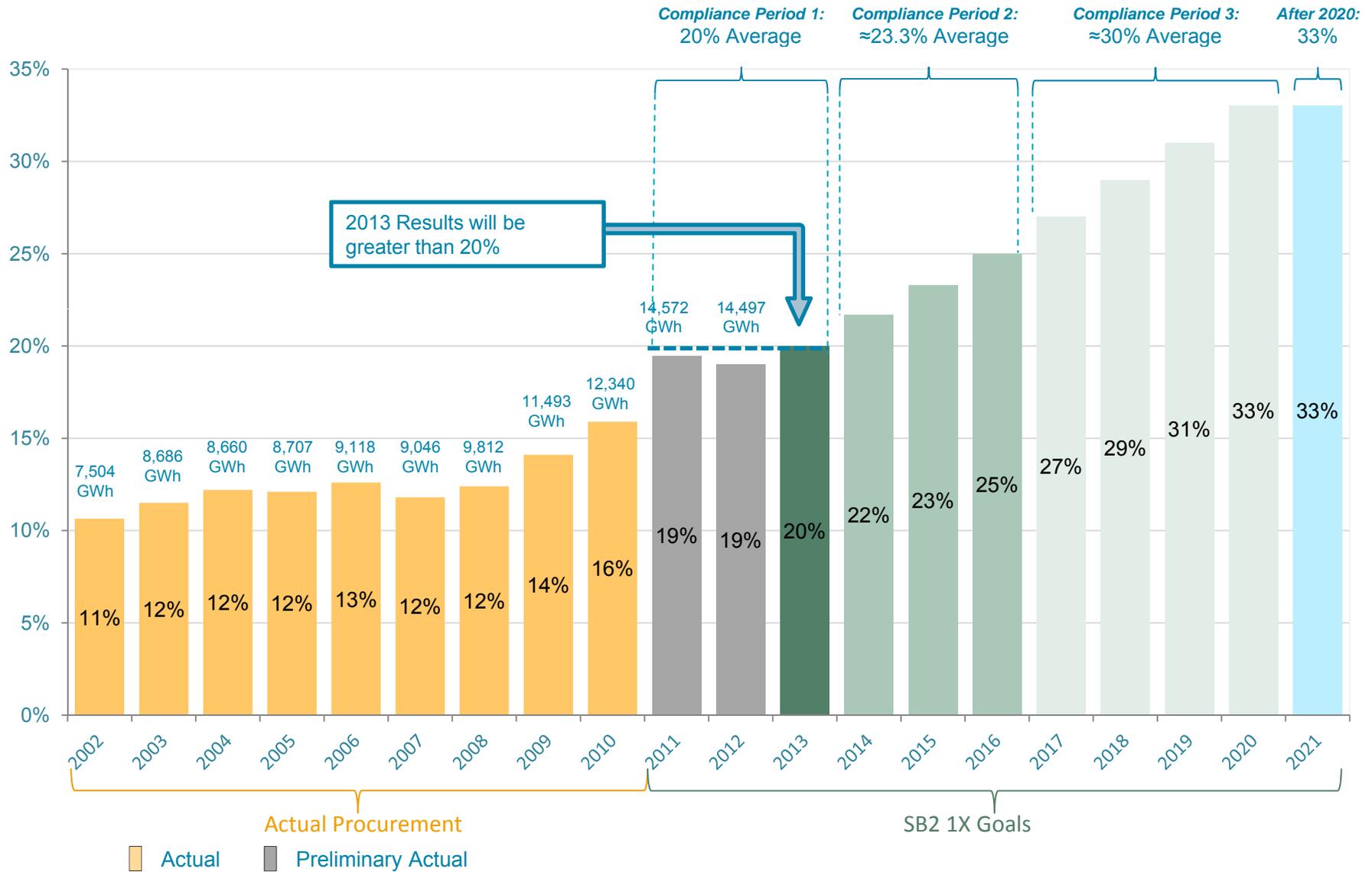
<sup>2</sup>Table includes terminated/expired/rejected contracts which are excluded in the map

<sup>3</sup>Bioenergy includes biomass, biogas and landfill gas

**Note:** Data tables current as of March 06, 2013; map current as of January 16, 2013.



# RPS Compliance: Past, Present, and Future



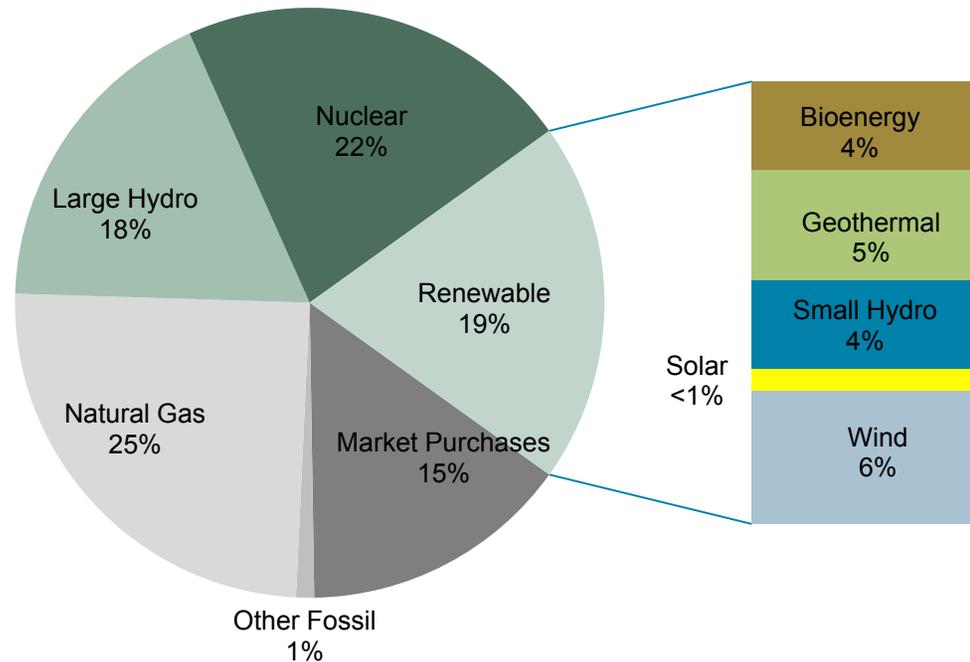
Notes: All percentages are rounded to nearest whole number; last updated on March 8, 2013



# 2011 Power Mix

	PG&E Preliminary 2011 Power Mix	PG&E 2010 Power Mix	PG&E 2009 Power Mix
<b>Eligible Renewable</b>	<b>19%</b>	<b>15.9%</b>	<b>14.4%</b>
Bioenergy	4%	4%	4%
Geothermal	5%	5%	4%
Small Hydroelectric	4%	3%	3%
Solar PV	<1%	<1%	<1%
Solar Thermal	0%	0%	0%
Wind	6%	4%	3%
<b>Nuclear</b>	<b>22%</b>	<b>24%</b>	<b>21%</b>
<b>Large Hydroelectric</b>	<b>18%</b>	<b>17%</b>	<b>13%</b>
<b>Natural Gas + Other Fossil</b>	<b>26%</b>	<b>25%</b>	<b>35%</b>
<b>Market Purchases</b>	<b>15%</b>	<b>18%</b>	<b>16%</b>
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Figures represent % of PG&E's total bundled retail sales



“Market Purchases” is non-auditable electricity purchased from the market and generally reflects energy mix of the Western United States

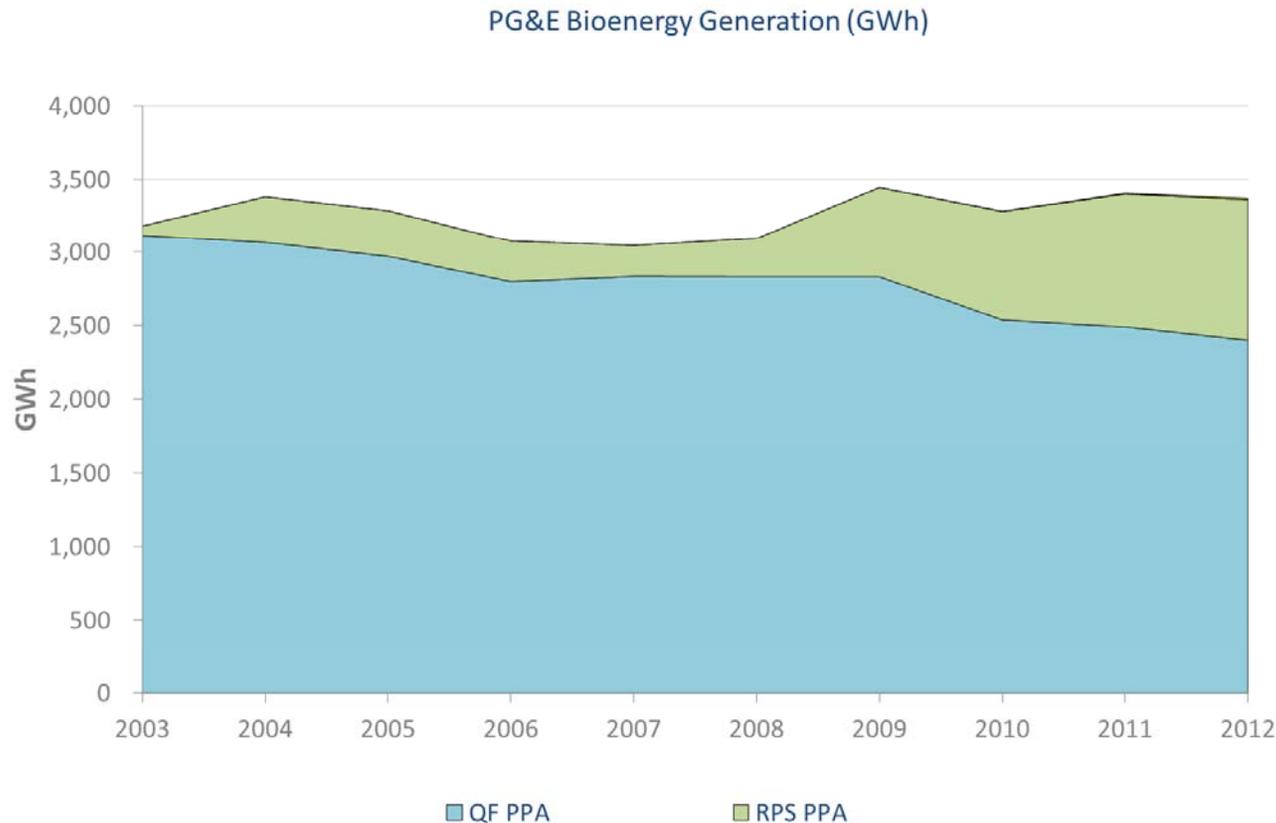
Sources: <http://www.pge.com/about/environment/pge/cleanenergy/> and PG&E's Energy Compliance and Reporting department as of May 31, 2012

Note: The 2012 preliminary will be reported during second Quarter 2013



## PG&E is Major Buyer of Bioenergy Given Our Size and Location

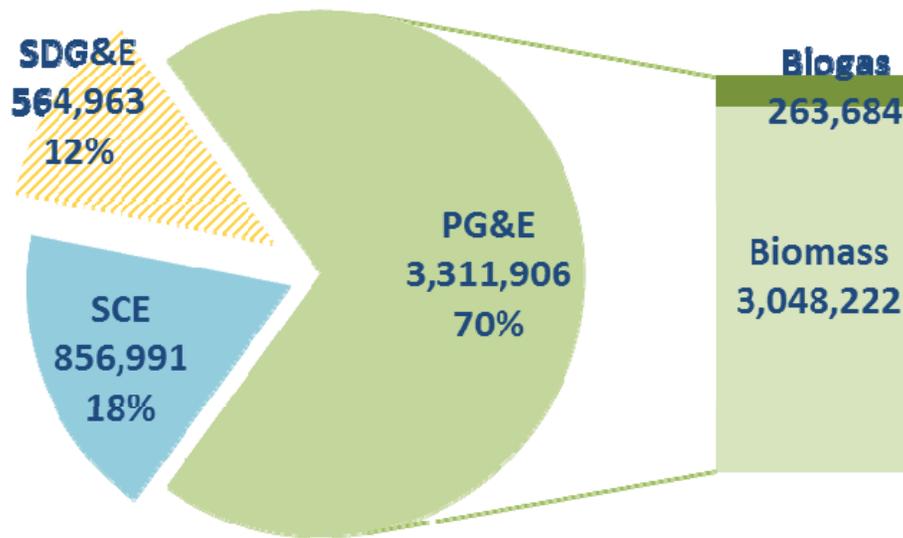
- Bioenergy deliveries represent a large and consistent historical portion of PG&E's RPS portfolio.
- PG&E purchased 3,373 GWh of Bioenergy in 2012, **representing 4.4% of PG&E's bundled retail energy sales.** (*10K Report*)



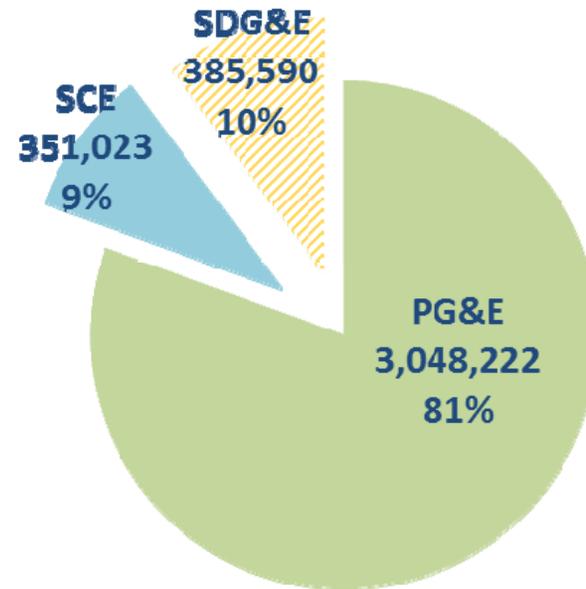


# PG&E Procures 70% of all Bioenergy and 81% of all Biomass Contracted to IOUs in CA

2011 Bioenergy Production by California Utility (MWh)



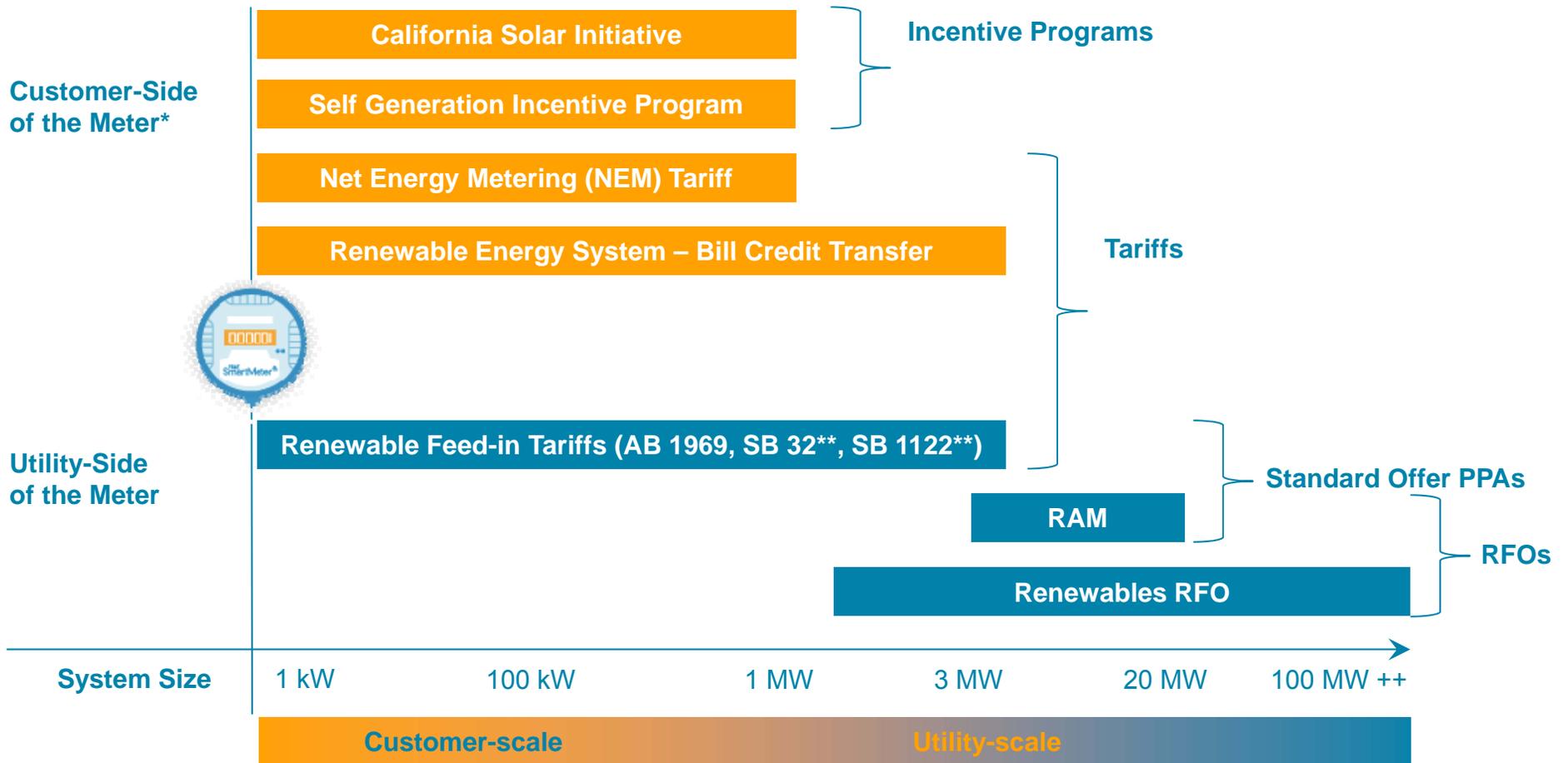
2011 Biomass Production by California Utility (MWh)



Source: CPUC Section 910 Report, March 2013



# Multiple Transaction Opportunities in the Renewable Energy Sector



\*Programs do not count towards RPS generation

\*\* Programs currently in regulatory proceedings



# Challenge to Deploying Bioenergy

- **Prices**
- **Value of Baseload Capacity**
- **Societal Benefits**

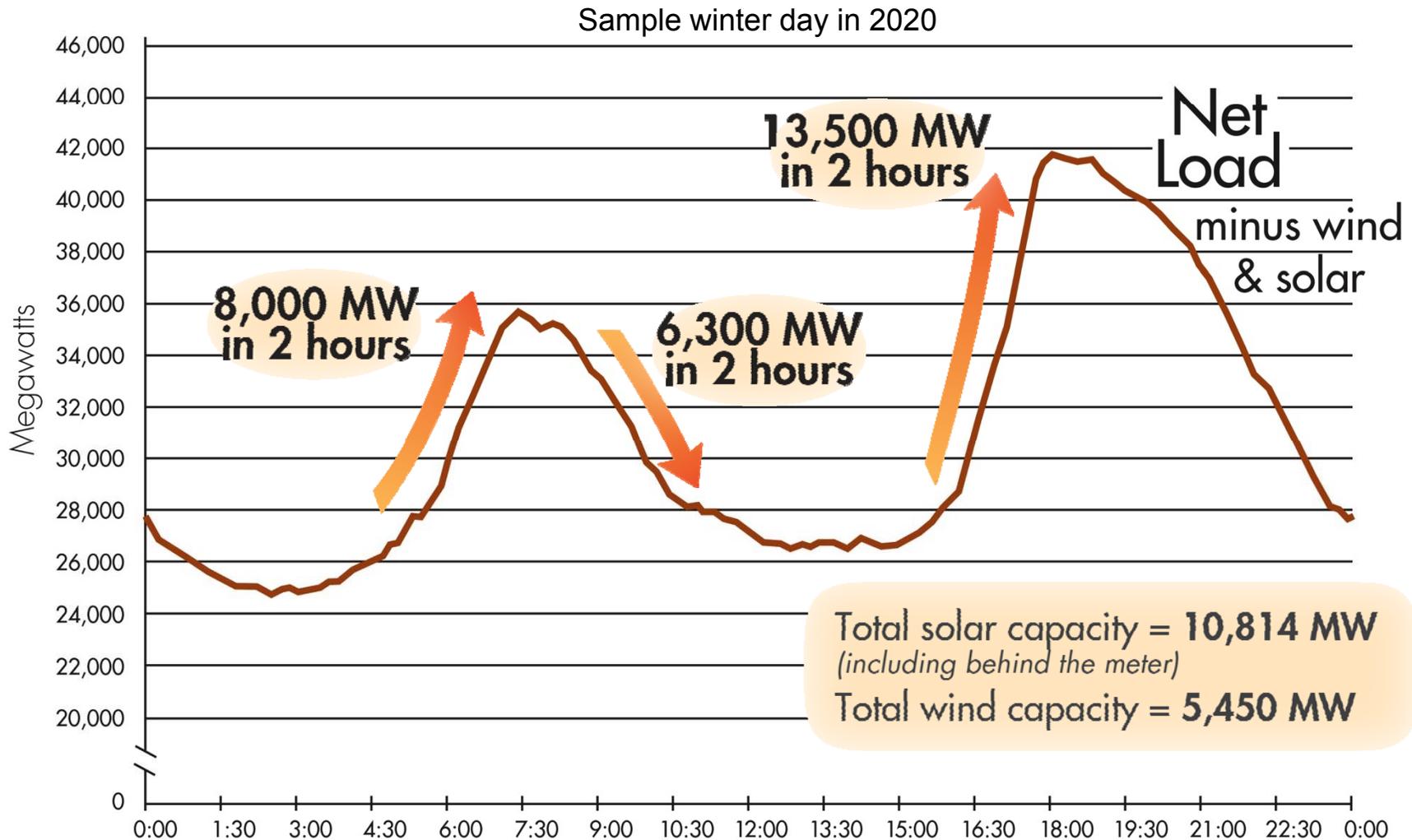


## Prices: Bioenergy Prices Higher Than Alternative Renewable Energy

- Recent auctions have resulted in executed, weighted average PPA price of less than \$90/MWh (*CPUC Quarterly Report, March 2013*)
- Levelized cost of electricity (LCOE) for Solar PV has dropped 62% since 2004 (*Bloomberg New Energy Finance*)
- Black & Veatch report indicates average blended price in the \$120 - \$185/MWh range with the overall range between \$80 - \$709/MWh (*Black and Veatch report, pg. 1-1 and pg. 1-5*)



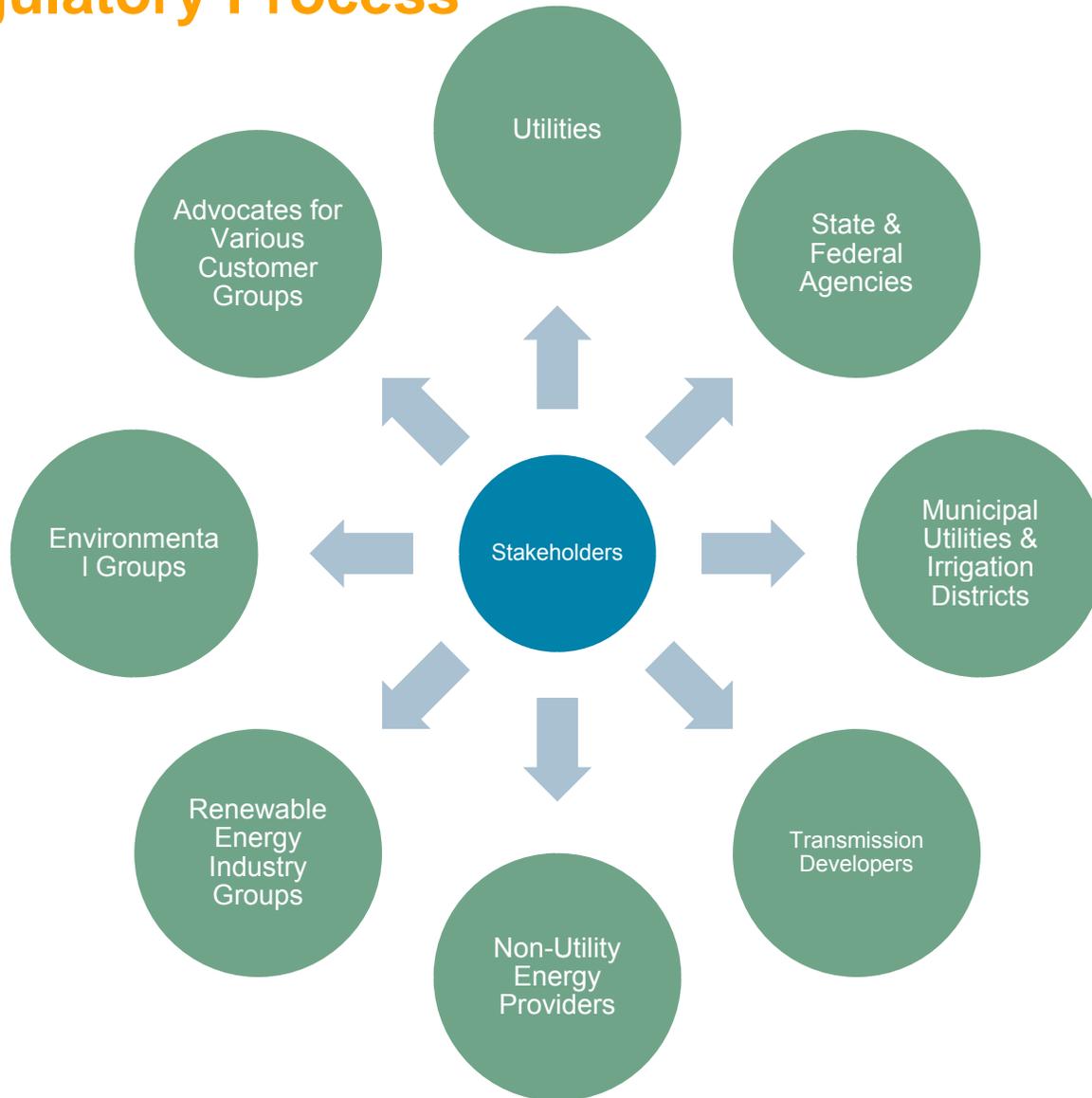
# Value of Baseload Capacity: Intermittency Driving Need for Flexible Capacity



Source: Adapted from California ISO presentation on December 20, 2012



## Societal Benefits: Major Stakeholders in the RPS Regulatory Process





## Summary

- PG&E is on track towards meeting the 33% RPS target and bioenergy has been a significant part of this success
- Many solicitation avenues are currently available for bioenergy
- Price and value should be considered