

California Biomass Collaborative

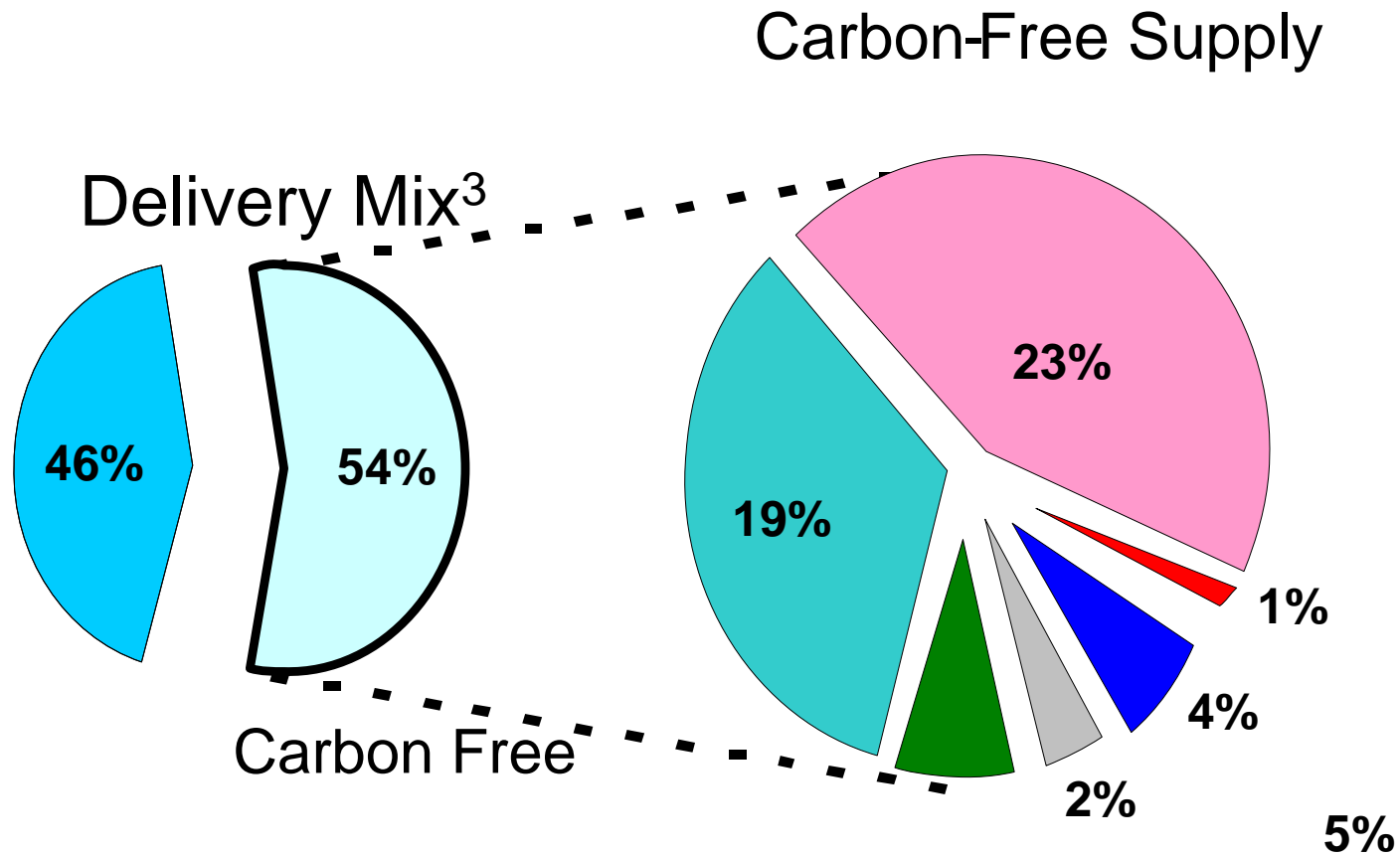
*Climate Change, Carbon Policies,
Renewable Energy and the Role of Biomass*

Utility Perspectives on Bioenergy for California



March 27, 2007

PG&E's 2005 Electric Delivery Mix



■ Fossil 46%

■ Bio-energy 5%

■ Large Hydro 19%

■ Small Hydro 4%

■ Nuclear 23%

■ Geothermal 2%

■ Wind 1%

Power Content Label

	2004 U.S.	2005 California	2005 PG&E
Eligible Renewable	2.3%	11%	12%
Biomass and waste	0.9%	2%	5%
Geothermal	0.4%	5%	2%
Small hydroelectric	0.6%	2%	4%
Wind	0.4%	2%	1%
Solar	<0.1%	0.2%	<0.1%
Large Hydroelectric	7%	17%	20%
Natural Gas	19%	38%	42%
Coal	49%	20%	1%
Other Fossil	3%	<1%	1%
Nuclear	19%	15%	24%

Bioenergy in PG&E's Renewable Portfolio

- PG&E currently receives 5% of its energy from bioenergy plants
- Pre-Renewable Portfolio Standard contracts:
 - Biogas: 14 contracts for 54 MW
 - Biomass: 21 contracts for 447 MW
- RPS Contracts:
 - Contracts with 7 bioenergy-fueled electric generating plants for ~1% of load since the start of RPS
 - Two recent biogas-into-pipeline contracts that will be used to fuel natural gas power plants

PG&E's Renewable Portfolio Standard Contracts to Date

2002 Interim Procurement - 113 MW

Calpine Geysers 13 & 20	110 MW	722 GWh	Geothermal	Operational
Wheelabrator #4	3 MW	25 GWh	Biomass	Operational

2003 Bilaterals - 68 MW

CBEA Projects (Sierra, CRES, Madera)	42 MW	305 GWh	Biomass	Operational
Big Valley Lumber	8 MW	41 GWh	Biomass	Operational
Diablo Winds	18 MW	65 GWh	Wind	Operational

2004 RPS RFO - 348 MW

FPL Energy-Montezuma Winds	32 MW	102 GWh	Wind	Apr-08
Buena Vista Energy LLC	38 MW	108 GWh	Wind	Q1-07
Pacific Renewable Energy	83 MW	280 GWh	Wind	Oct-08
Shiloh 1 Wind Project LLC – PPM	75 MW	225 GWh	Wind	Operational
Military Pass – Newberry Volcano	120 MW	840 GWh	Geothermal	Sep-08

PG&E's RPS Contracts to Date

2005 RPS RFO/Bilaterals - 499 MW

HFI Silvan	40 MW	142 GWh	Biomass	Jul-08
Liberty Biofuels McCarthy Family Farms	10 MW	70 GWh	Biofuels	Dec-09
Bottle Rock USRG	55 MW	385 GWh	Geothermal	Jul-07
IAE Truckhaven	49 MW	366 GWh	Geothermal	Jan-09
Global Common	18 MW	144 GWh	Biomass	Sept, Dec-07
Newberry	120 MW	840 GWh	Geothermal	Oct-09
Calpine Geysers	200 MW	922 GWh	Geothermal	Operational
Palco	7 MW	36 GWh	Biomass	Operational

2006 RPS RFO/Bilaterals - ? MW

Microgy			Biogas	
BioEnergy Solutions			Biogas	
RPS Contracts must be filed by 6/30/07				

Bioenergy Alternatives

- PG&E provides an increasing menu of alternatives for the agricultural and forestry industries to participate in renewable energy markets
 - Renewable Portfolio Standard
 - Small Generator Contract
 - Digester gas options
 - Alternatives to open burning
 - Greenhouse Gas offset value
- Seeking funding for bioenergy emerging technologies as part of Emerging Renewable Resource Program at the CPUC

Dairy Biogas Overview

- California has 1.7 million cows in 2,100 dairies
 - 75% in Northern California
 - 50% in San Joaquin Valley
- Dairies release methane and other reactive organic gases (ROGs)
- Methane has 21 times the greenhouse gas (GHG) impact of CO₂
- San Joaquin Valley is a non-attainment area for air quality, which is affected by ozone created by ROGs
- Converting methane to pipeline-quality gas or generating electricity reduces methane-related issues while producing income
- PG&E offers several alternatives for dairies:
 - Net Metering
 - RPS RFO
 - *Full output/surplus sale (< 1 MW)*
 - *Pipeline-Quality Biogas*



Pipeline Quality Biogas: Pilot Gas Supply Contracts

- PG&E has filed two demonstration contracts to purchase biogas for use in electrical generation.
- PG&E intent is to transport biogas to large generation sites and use biogas instead of the natural gas to produce electricity
 - PG&E is seeking approval to qualify electricity as eligible renewable generation under RPS
- If approvals received on demonstration contracts, program will expand
- Supplier Responsibility
 - Digesters
 - Scrubbing equipment
 - Pipeline to deliver to PG&E
 - Compression
 - Reimburse PG&E for meter installation and pipeline tap unless over 500 mcf per day

Biogas Options

Summary of Biogas Options	Tariff covering Interconnection Requirements	Generator Size / Limits	Aggregate Load of other Dairy Accounts?	Suggested Guidelines
Biogas Net Metering	CPUC NEMBIO Rule 21	≤ 1 MW (up to 3 project from 1 to 10 MW statewide)	Yes	Generation should be matched to load
Power Purchase Agreement (when approved)	FERC Small Generation Interconnection Agreement	Exports may not exceed Megawatt	n/a	When more generation than load
Renewable Portfolio Standard & 3 rd Party Sale	FERC Small or Large Generator Interconnection Agreement	Individually or aggregated to be > 1 MW	n/a	When more generation than load
Serve Own Load	CPUC Rule 21	n/a	n/a	When more load than generation
Gas Purchase	n/a	n/a	n/a	Near pipeline with enough volume to cover interconnection costs

Agricultural and Forestry Waste

- Working with San Joaquin Valley Air Pollution Control District to address open burning issue:
 - SB 705 requires open burning permits to be stepped down in 2007 and terminated in 2010
 - In 2005, almost 800,000 tons of biomass were open burned
 - 800,000 tons is the equivalent of ~300 MW of generation
- Exploring how best to dispose of agricultural and forestry waste including:
 - co-firing in coal plants
 - restarting closed biomass plants (recently signed contracts for two plants)
 - working with Gas Technology Institute and others to demonstrate emerging technologies
- Biggest challenges with agricultural waste are dispersed nature and seasonality

Bioenergy Emerging Technology Needs

- Seeking funding for bioenergy emerging technologies as part of Emerging Renewable Resource Program at the CPUC to complement existing funding sources
- Challenges
 - Dispersed fuel supply
 - Seasonal fuel supply
 - Air quality
 - Costs
- Needs
 - Small, cheap, and efficient biomass gasifiers
 - Low-emission distributed generation to burn biogas
 - Pipeline-quality biogas from biological (digesters) or thermo-chemical (gasification and methanation) sources
 - Liquid biofuels that are competitively priced with fossil fuels

PG&E “Climate Smart” Program

- Allows customers to make their PG&E electricity and natural gas use “climate neutral” (three year demonstration program)
- Customer participation is voluntary
- Premiums invested in California-based greenhouse gas emission reduction projects
- Initial investments will be in forest sequestration projects
- Dairy methane reduction projects are in the plans
- Other agriculture and forestry protocols likely
- Competitive solicitation for projects
- Roll-out to customers in June

RPS Pricing Benchmarks

Market Price Referent (MPR)

- Under current California law, utility is not required to pay above a “market price referent” (MPR) for renewable generation procured through Commission-approved RPS solicitation
- MPR is based on cost of long term (>10 year), fixed-price, conventional (i.e., fossil fuel) generation with market forward curves for gas updated each time MPR is set
- Annual MPR not released until after bids received. Contracts cannot be filed until MPR is issued.

Supplemental Energy Payment

- Portion of contract price that is above MPR is eligible to be paid by state subsidy, Supplemental Energy Payment (SEP), which is funded by ratepayer “Public Goods Charges”
- California Energy Commission administers SEPs, but cannot assure that the State does not use the targeted funds for other purposes, creating financing problem for SEP-dependent developer.

2006 Market Price Referent: ~8 to 9¢/kWh

Adopted 2006 Market Price Referents (Nominal - dollars/kWh)			
Resource Type	10-Year	15-Year	20-Year
2007 Baseload MPR	0.08080	0.08212	0.08460
2008 Baseload MPR	0.08014	0.08231	0.08519
2009 Baseload MPR	0.07960	0.08260	0.08586
2010 Baseload MPR	0.07965	0.08333	0.08691
2011 Baseload MPR	0.07891	0.08308	0.08689
2012 Baseload MPR	0.07962	0.08421	0.08821
2013 Baseload MPR	0.08073	0.08567	0.08982
2014 Baseload MPR	0.08230	0.08747	0.09169
2015 Baseload MPR	0.08436	0.08965	0.09393

SB 1036 (Perata) – SEP Reform

- Lack of assurance that the State will not use SEP targeted funds for other purposes has made financing a project dependent on SEPs difficult.
- SB 1036 would:
 - eliminate the CEC-administered SEP program,
 - refund collected RPS Public Good Charge funds to electric customers,
 - preserve the market price referent,
 - set aside the equivalent of SEP funds as a cap on above-market costs of contracts needed to achieve the Annual Procurement Target.
- The above-market component of a Power Purchase Agreement would be approved by the CPUC when it approves an above-market priced RPS contract.
- PG&E will support this bill.

2007 RPS Solicitation and Evaluation Process

- Utility submits RPS Procurement Plan for approval and initiates an RPS solicitation.
- Utility uses “least-cost, best-fit” evaluation criteria to develop ranking and “short-list” of bidders
 - “Least-cost” is not just lowest price, but lowest cost relative to market value of energy and cost of transmission
 - “Best-fit” with particular utility resource needs (e.g., curtailability, dispatchability, local reliability, and repowering are quantified in evaluation)
- Utility engages in extensive bilateral negotiation with short-list bidders to develop final contracts for pre-approval
- Utility consults with its “Procurement Review Group”

PG&E's 2007 RPS Solicitation - Schedule

Date	Event
March 12, 2007	Issue Solicitation
March 23, 2007	Bidders submit optional Notice of Intent to Bid
April 3, 2007, 10 am – Noon	Bidders Conference
May 31, 2007	Deadline for Offers
July 16, 2007	PG&E to notify Shortlist
Q3-Q4, 2007	Negotiate, execute, and file contracts for CPUC Approval

Highlights of 2007 RPS RFO

- Procurement goal
 - 1-2% of load ~ 750-1500 GWh per year
- Delivery point - anywhere in California
 - If outside CAISO, also make offer to deliver to CAISO
- Credit/collateral reduced during development
- Updated Time of Delivery (TOD) Factors

Monthly Period	Super-Peak	Shoulder	Night
Jun – Sep	2.037	0.921	0.700
Oct.- Dec., Jan. & Feb.	1.203	1.049	0.841
Mar. – May	1.030	0.855	0.656

Communications

- Website:
http://www.pge.com/suppliers_purchasing/wholesale_electric_supplier_solicitation/renewables2007.html
- Email questions to: renewableRFO@pge.com