

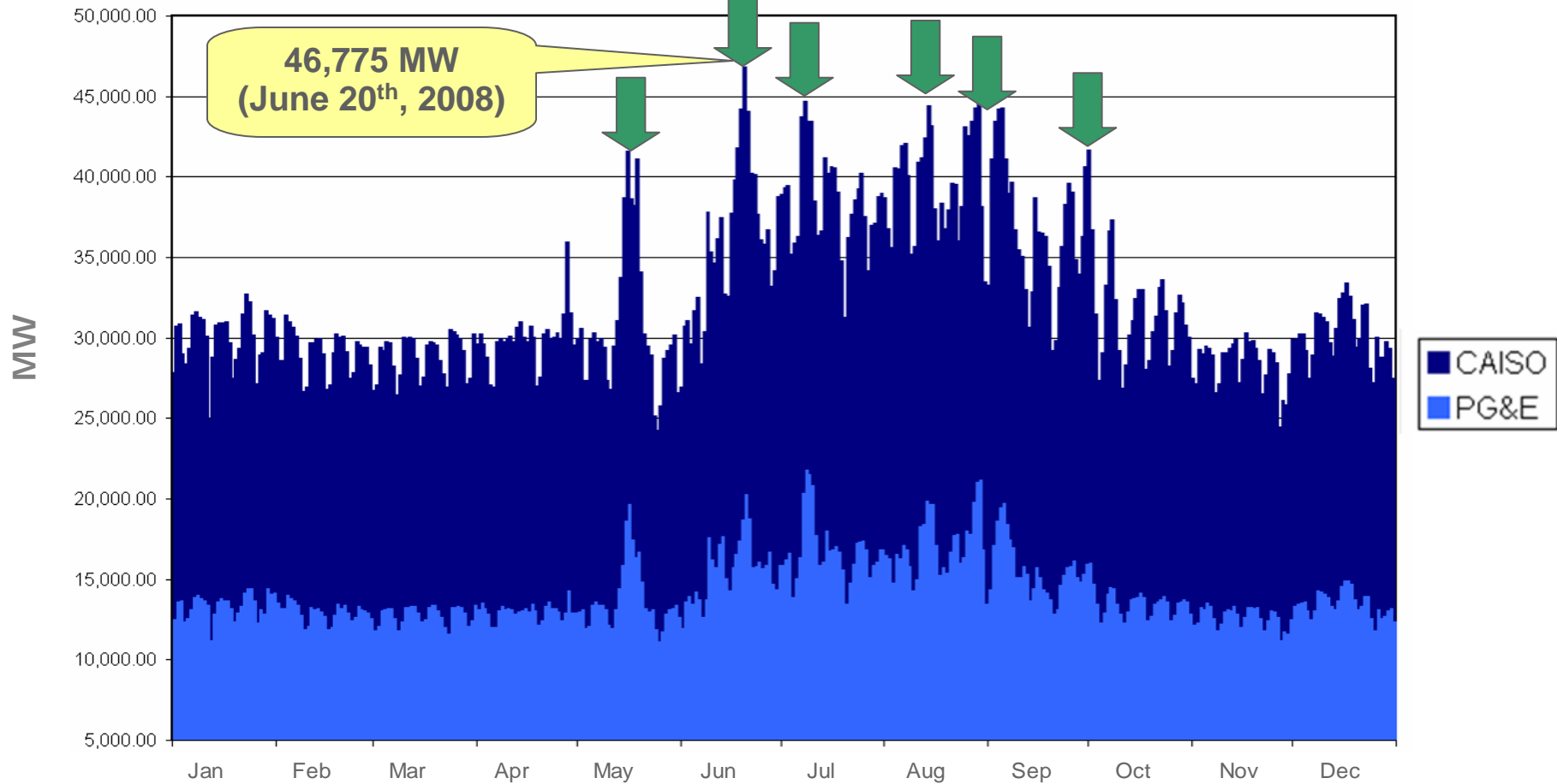


PG&E Demand Response Programs: An Overview

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November 17, 2009

California's Electricity Need

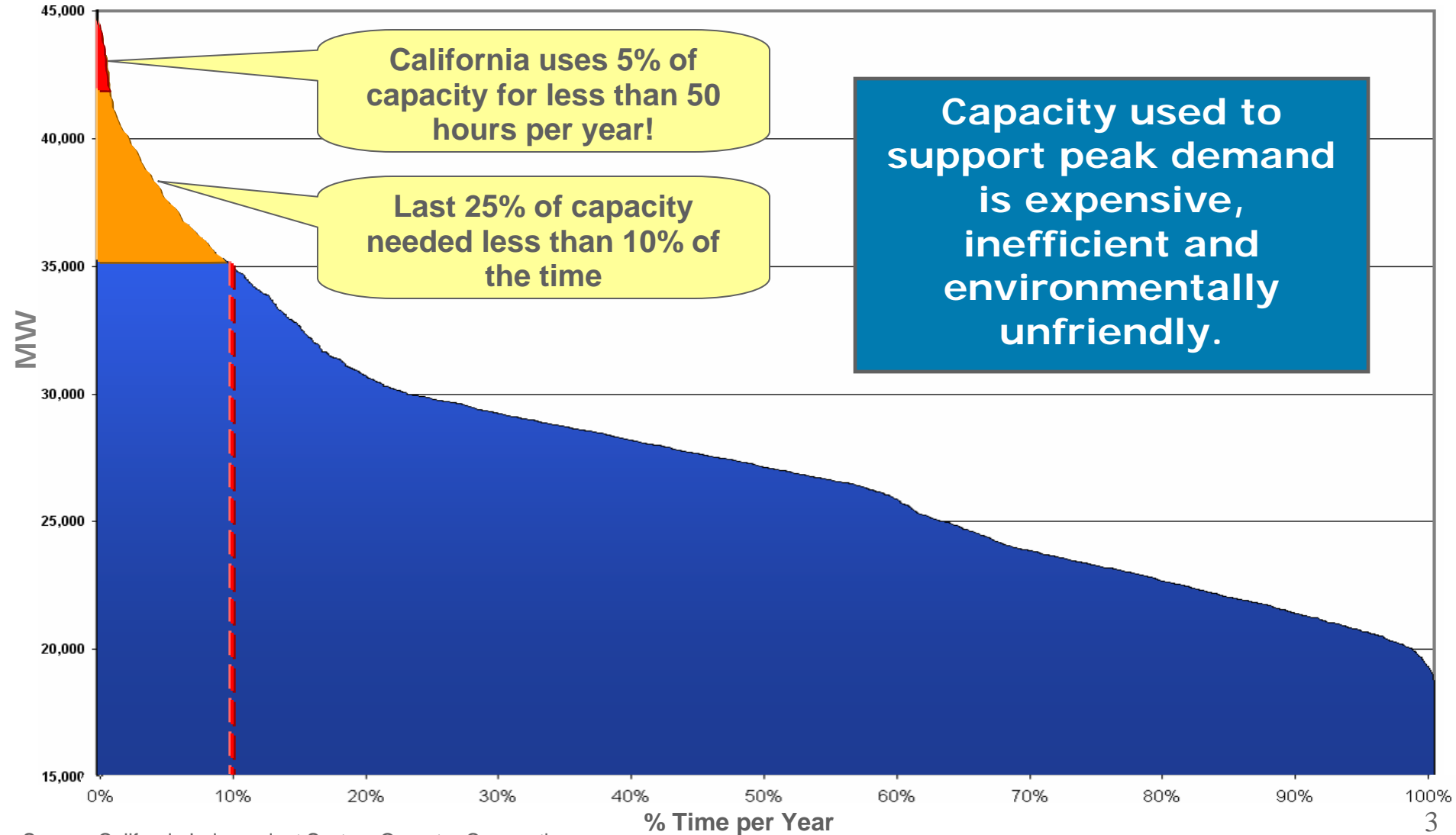
2008 System Load (CAISO / PG&E)



Electric demand is highly variable, with peaks that require higher capacity during short periods.

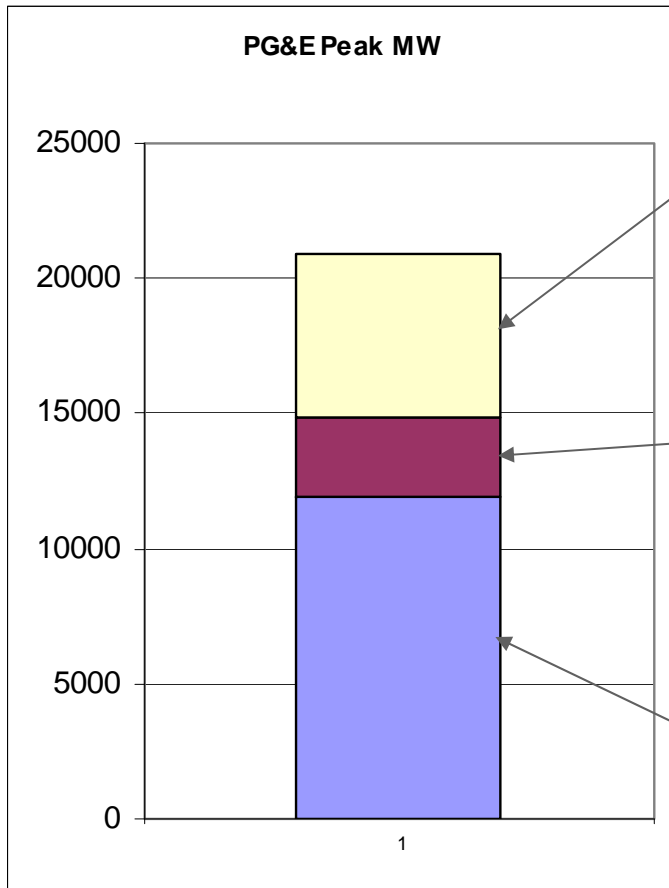
California's Electricity Need

System Load Duration Curve



- Reduces electrical demand during “critical peak” periods
- Rewards customers contributing to demand reduction
- Enables:
 - Reduced need for excess generation capacity to serve peak loads: DR is a “virtual peaking plant”
 - Enhanced electric grid reliability
 - Lower average electric procurement costs
 - Lower environmental impact

Demand Response Opportunities



Large Commercial and Industrial (>200 kW)

- Air Conditioning
- Lighting
- Refrigeration
- Process

Medium Commercial and Industrial (20 kW-200kW)

- Air Conditioning
- Lighting
- Refrigeration
- Process

Residential and Small Commercial (<20 kW)

- Air Conditioning
- Plug-in EV

Demand Response: From Utility Energy Procurement Point of View



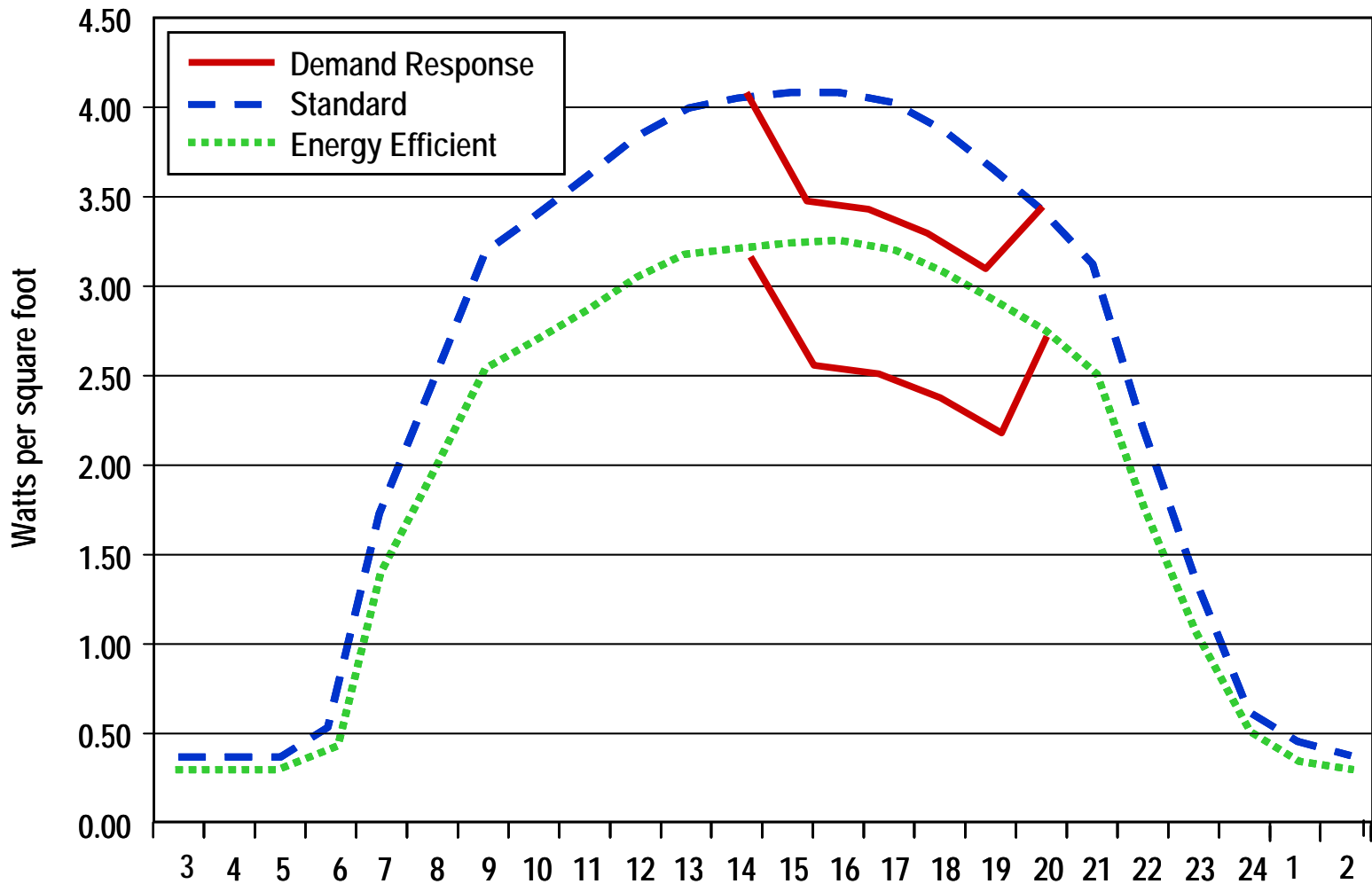
- **Connect customer demand response capability and CAISO markets**
 - Provide retail tariffs and programs to the customers: call events and settle with customers
 - Schedule load, bid DR and settle with CASIO

- **Use DR capability to meet Resource Adequacy Requirements**

Demand response:

- Occasional, temporary reduction - when notified or when prices are high
- Pays incentives
 - Enablement - hardware, software, equipment, controls, programming
 - Participation - reduce demand temporarily when called
 - More commitment to flexibility = higher incentives

Demand Response vs. Energy Efficiency



- **Technical Incentives (TI)**
 - Up to \$125/kW of demonstrated load drop
 - Up to 50% of project cost for retrofit
 - Up to 100% of project cost for new construction
 - Must participate in DR program for 3 years
 - DBP & PeakChoice Best Effort = \$50/kW

- **Auto-DR**
 - Up to \$300/kW (goes to \$250/kW in Jan 2010)
 - Up to 100% of project cost, you must be in DR for 3 years
 - Facility control system communicates directly with PG&E
 - You have full control and can opt out

Participation Programs: Key Features



- **Notification: Day-ahead vs. Day-of**
- **Commitment: Voluntary vs. Committed**
- **Event Trigger: Emergency vs. Price Sensitive**
- **Operating Months: Summer vs. Year-around**
- **Curtailment Window: Afternoon hours vs. 24 hours**

Current DR Participation Programs for Large Commercial and Industrial Customers



Voluntary

- Demand Bidding Program (DBP) – 103 MW
- PeakChoice (Best Effort) – 1 MW

Committed

- PeakChoice (Committed) – 4 MW
- Aggregator Programs
 - Capacity Bidding Program (CBP) – 52 MW
 - Aggregator Managed Portfolio (AMP) – 110 MW
- Base Interruptible Program (BIP) – 243 MW
- Bilateral Contracts (DWR) – 200 MW

Dynamic Rates

- Critical Peak Pricing Program (CPP) – 11 MW

Committed Programs

- Smart AC – 137 MW

Dynamic Rates

- SmartRate* – 9 MW

* a CPP type rate

New to DR, no EMS, low flexibility, unpredictable demand, different staff daily?

- **PeakChoice - Best Effort**
 - Min 10 kW, choose 30 min, 4.5 hours, 1 day, 2 day notice
 - Also choose duration, # events, kW, time of day, and more
 - No penalty, payments only when called & when perform

- **Demand Bidding Program (DBP)**
 - Min 50 kW bid, min 2 consecutive hours
 - Day-of (\$. 60/kW) and day-ahead (\$.50/kW) notice
 - Choose to bid in when called, no penalty for non-performance

Have variable demand by season, or by month?

- **Capacity Bidding Program (CBP)**

- can bid different kW each month
- capacity and energy payments, incentives vary by month
- sign up via aggregator or can self aggregate

Want guaranteed payments and control over event criteria?

- **PeakChoice - Committed**

- Min 10 kW, choose 30 min, 4.5 hours, 1 day, 2 day notice
- Also choose duration, # events, time of day and more
- Guaranteed monthly capacity payments, plus energy payments
- Penalties for non performance, but some break even flexibility

Committed Participation Programs: Emergency



Can shift operations to off-peak, desire high incentives, can respond in 30 minutes, year round?

- **Base Interruptible Program (BIP)**
 - Greater of 100kW or 15% of max peak
 - Paid to reduce load down to FSL; Penalty \$6/kWh
 - Temporarily capped; waiting list
 - Enroll Directly or through a BIP Aggregator

Can be flexible with your operations with day-ahead notice and prefer defined number of events?

- **Critical Peak Pricing (CPP)**

- earn credits (discounted rate) May – Oct
- No penalties, high price 12-6 PM on up to 12 days
- Energy charge multiplied by 5 for on-peak and 3 for off-peak hours

- Note: CPP will transition to Peak Day Pricing (PDP) in 2010.

Plus more DR Programs:

- AMP: 5 aggregators, proprietary offers, find your unique fit
- Permanent Load Shift – Thermal Energy Storage (HVAC)
- SmartAC (under 200 kW)

History of Events



History of Events Called				
	2006	2007	2008	2009
CPP	11	12	11	12
DBP	18	1	1	1
BIP	1	1	1	1
AMP		3	7	5
CBP		11	6	2
SmartAC		1	1	0
PeakChoice				1

Large Office Building:

- Identified 337 kW of DR potential
- TI = up to \$42,125 or AutoDR = up to \$101,100
- PeakChoice Committed = \$27,418 (total May – Oct)

Mid Size Grocery Store:

- Identified 80 kW of DR potential
- TI = up to \$10,000 or AutoDR = up to \$24,000
- PeakChoice Committed = \$6,508 (total May – Oct)

Unified School District:

- Identified 1 MW of DR potential
- TI = up to \$125,000 or AutoDR = up to \$300,000
- PeakChoice Committed = \$81,360 (total May – Oct)

Small Hotel:

- Identified 29 kW of DR potential
- TI = up to \$3,625 or AutoDR = up to \$8,700
- PeakChoice = \$2,359 (total May – Oct)

Refrigerated warehouse:

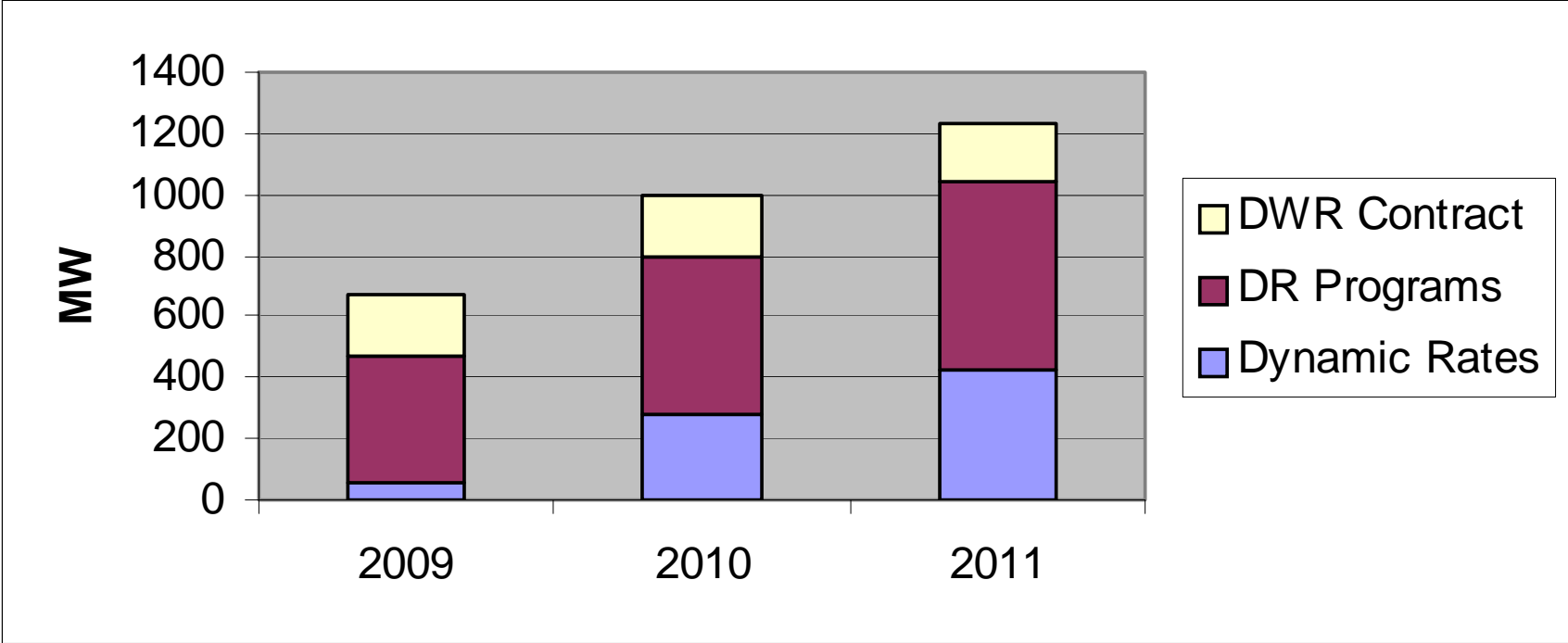
- Identified 1.3 MW of DR potential
- TI = up to \$162,500 or AutoDR = up to \$390,000
- PeakChoice Committed = \$105,000 (total May – Oct)

Food Processing Plant:

- Identified 8 MW of seasonal DR potential
- TI = up to \$500,000 or AutoDR = up to \$1.2 million
- Capacity Bidding = \$320,880 (total Sep – Oct)

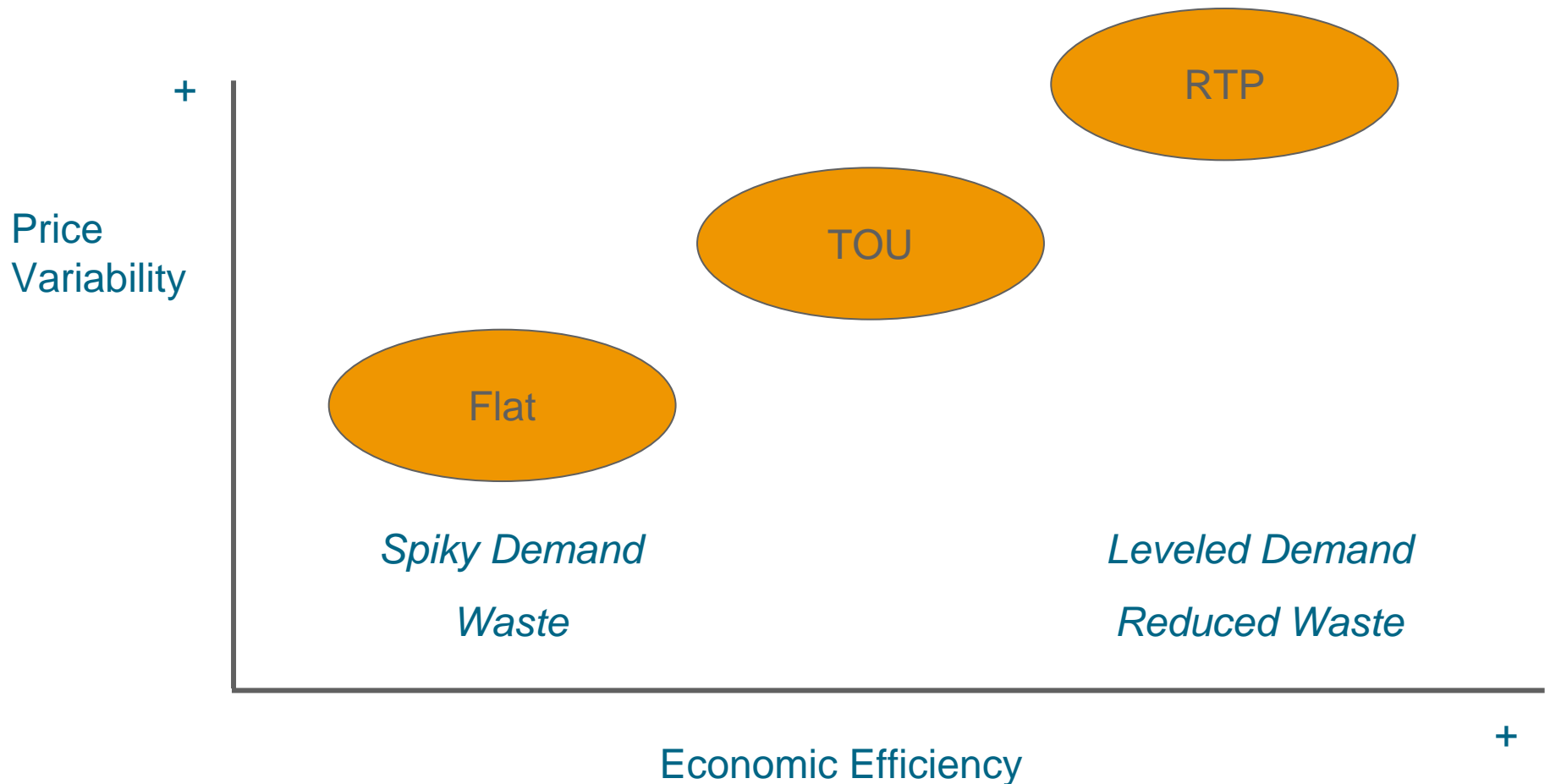
- **Dynamic Pricing (Dynamic Rates) for all customer classes**
- **Integration with the CAISO operations and markets**
 - Emergency programs are being restructured to be more price sensitive
 - Programs are being modified for local dispatch
 - DR resources are being utilized to provide ancillary services
- **Integration with other EE and Distributed Generation Activities (Audits, Incentive Programs, Marketing Activities)**
- **Automation through enabling technology**
- **DR leveraging SmartMeter and Home Area Network related activities**

Delivered DR MW in PG&E Service Area



- Statewide initiative for dynamic pricing
- Peak day pricing (PDP) rate proposal
- PDP rate design and options

Moving Toward A More Efficient Model



- **Time of Use (TOU):** Prices vary across peak and off-peak hours and sometimes also across seasons. The rates and pricing periods are fixed ahead of time.
- **Critical Peak Pricing (CPP) and Peak Day Pricing (PDP):** Very high prices on event days. Discounted TOU rates during other times.
- **Real-time Prices (RTP):** Prices vary around the clock and are not known ahead of time. They are communicated to customers on a day-ahead or hour-ahead basis.

As the first step toward dynamic pricing, PDP:

- Allows the price of electricity to reflect the true costs
- Provides lower energy rates on non-event days in exchange for higher rates on event days
- Includes options within the rates to maximize customer participation and acceptance

While PDP is a default rate plan, the rate is not mandatory and customers can opt out of PDP before the deadline.

Peak day pricing (PDP) proposal



The deadline for PDP decisions will be:

- May 1st, 2010 for the first group
 - Includes large commercial and industrial customers across PG&E's electric service territory that have service agreements with a demand of 200kW or greater that are on an A10, E19 or E20 tariff.
- February 1st, 2011 for the second group
 - Includes small and medium-size businesses as well as large agricultural customers

Customers will default to PDP beginning on these dates, or when 12 months of interval data becomes available.

Customers exempt from PDP:

- Demand response program participants (except CPP)
- Customers without qualifying interval meters for the past 12 months
- Direct Access (DA) customers
- Net metered, streetlight/traffic control, and standby load customers

The number of events based on temperature will vary each year:

- Estimated average of 10-11 events per year, over past 25 years
- Rates were designed for an average of 12 events
- PG&E has proposed that the number of peak events always be between 9 and 15
- Typically, events take place during the summer but may also occur during the winter

System-wide peak events could be triggered by:

- Temperatures at or above 98° on weekdays or 105° on weekends & holidays; or
- California ISO declares emergency conditions; or
- Extremely high market prices



Notification of peak events will be communicated via email and phone.

PDP rate design and options



Time-of-Use (TOU) rates for Summer (May-Oct):

	MON	TUES	WED	THUR	FRI	SAT	SUN	HOLIDAY
8:30 AM	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green
12:00 PM	Red	Red	Red	Red	Red	Green	Green	Green
6:00 PM	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green
9:30 PM	Green	Green	Green	Green	Green	Green	Green	Green
8:30 AM	Green	Green	Green	Green	Green	Green	Green	Green

Credits

- PDP will provide reduced summer-season demand and energy charges
- Credit amounts will vary depending on rate schedule (E19, E20, or A10) and service voltage

Charges

- PDP includes charges for peak event periods, which are called from 2–6pm on peak event days (between 9 and 15 events)
- The price of electricity during peak event periods will increase \$1.20 (proposed) per kWh over the normal rate

PDP rate design and options



Proposed PDP rate schedule for E19S:

	Schedule E19S – TOU				PDP Charges/Credits				Schedule E19S – PDP		
		Summer	Winter			Summer	Winter			Summer	Winter
Peak Days		--			Usage	\$1.20 per kWh			Usage	\$1.20 per kWh	
On-Peak	Demand	\$12.77	--	+	Demand	-\$6.10	--	=	Demand	\$6.67	--
Part-Peak	\$/kW	\$2.91	\$1.04		\$/kW	-\$1.30	--		\$/kW	\$1.61	1.04
Maximum		\$7.26	\$7.26			--	--			\$7.26	\$7.26
On-Peak	Energy	14.243	--		Energy	-0.355	--		Energy	13.888	--
Part-Peak	cents per kWh	9.566	8.443		cents per kWh	-0.071	--		cents per kWh	9.495	8.443
Off-Peak		7.652	7.361	--		--	7.652	7.361			
Cust Chrg	\$/month	\$413	\$413		\$/month	--	--		\$/month	\$413	\$413

PDP rate design and options



Proposed PDP rate schedule for A10S:

Schedule A10S – TOU		
	Summer	Winter

PDP Charges/Credits		
	Summer	Winter

Schedule A10S – PDP		
	Summer	Winter

Peak Days		--
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Usage	\$1.20 per kWh	
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Usage	\$1.20 per kWh	
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Maximum	Demand	\$9.58	\$5.32
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+

Demand	-\$2.05	--
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=

Demand	\$7.53	\$5.32
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On-Peak	Energy	15.176	--
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Energy	-1.407	--
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Energy	13.769	--
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Part-Peak	cents per	12.918	10.133
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cents per	-1.407	--
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cents per	11.511	10.133
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Off-Peak	kWh	11.573	9.055
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kWh	-1.407	--
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kWh	10.166	9.055
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Cust Chrg	\$/month	\$120	\$120
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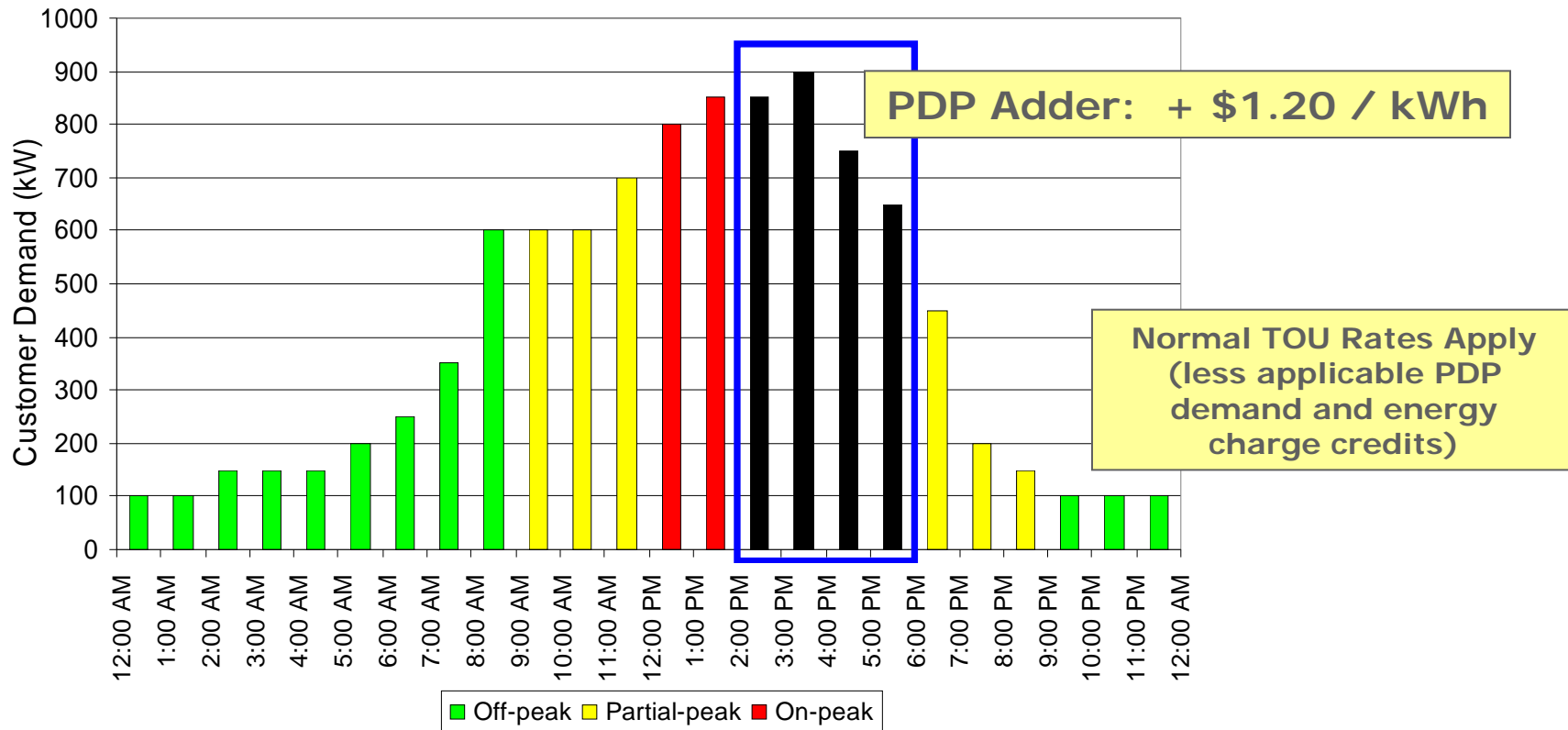
\$/month	--	--
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\$/month	\$120	\$120
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PDP rate design and options



Charges during Summer event weekday:



Note: First Partial Peak begins at 8:30am; Second Partial Peak ends at 9:30pm

Capacity Reservation (E19 & E20 rates)

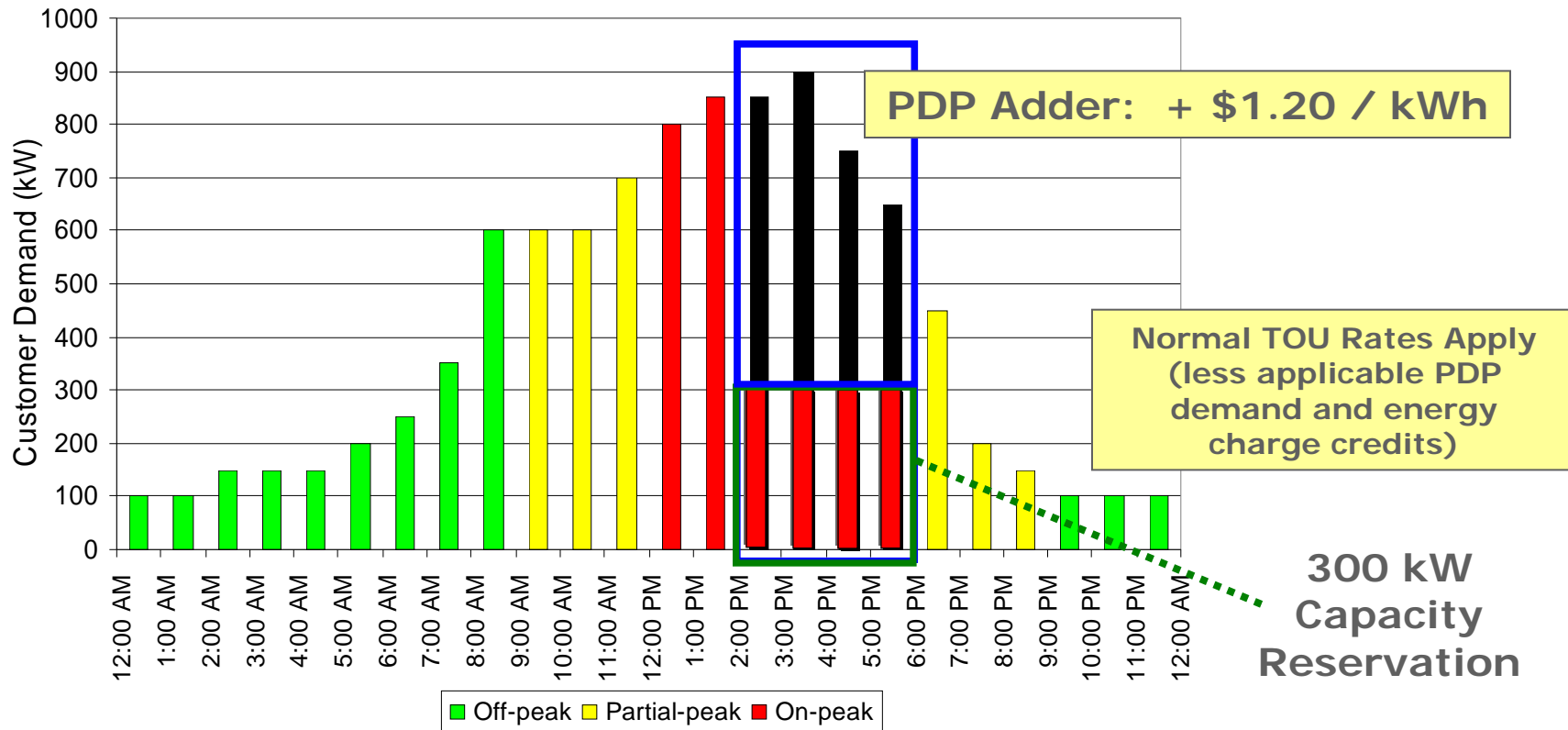
- Customers can pay fixed charges for a portion of their peak demand
- This portion of on-peak usage will be protected from the PDP adder during peak events

The capacity reservation charge (CRC) provides insurance against PDP charges and mitigates bill volatility.

PDP rate design and options



Summer Event Weekday (hours):



Note: First Partial Peak begins at 8:30am; Second Partial Peak ends at 9:30pm

Capacity Reservation Details

- PDP credits are nullified for usage within the Capacity Reservation
- If your demand is less than the reservation, you will still be charged for the full amount
- Default setting is 50% of the customer's average peak-period maximum demand during the most recent summer season

The capacity reservation charge (CRC) provides insurance against PDP charges and mitigates bill volatility.

A10 Rate Options

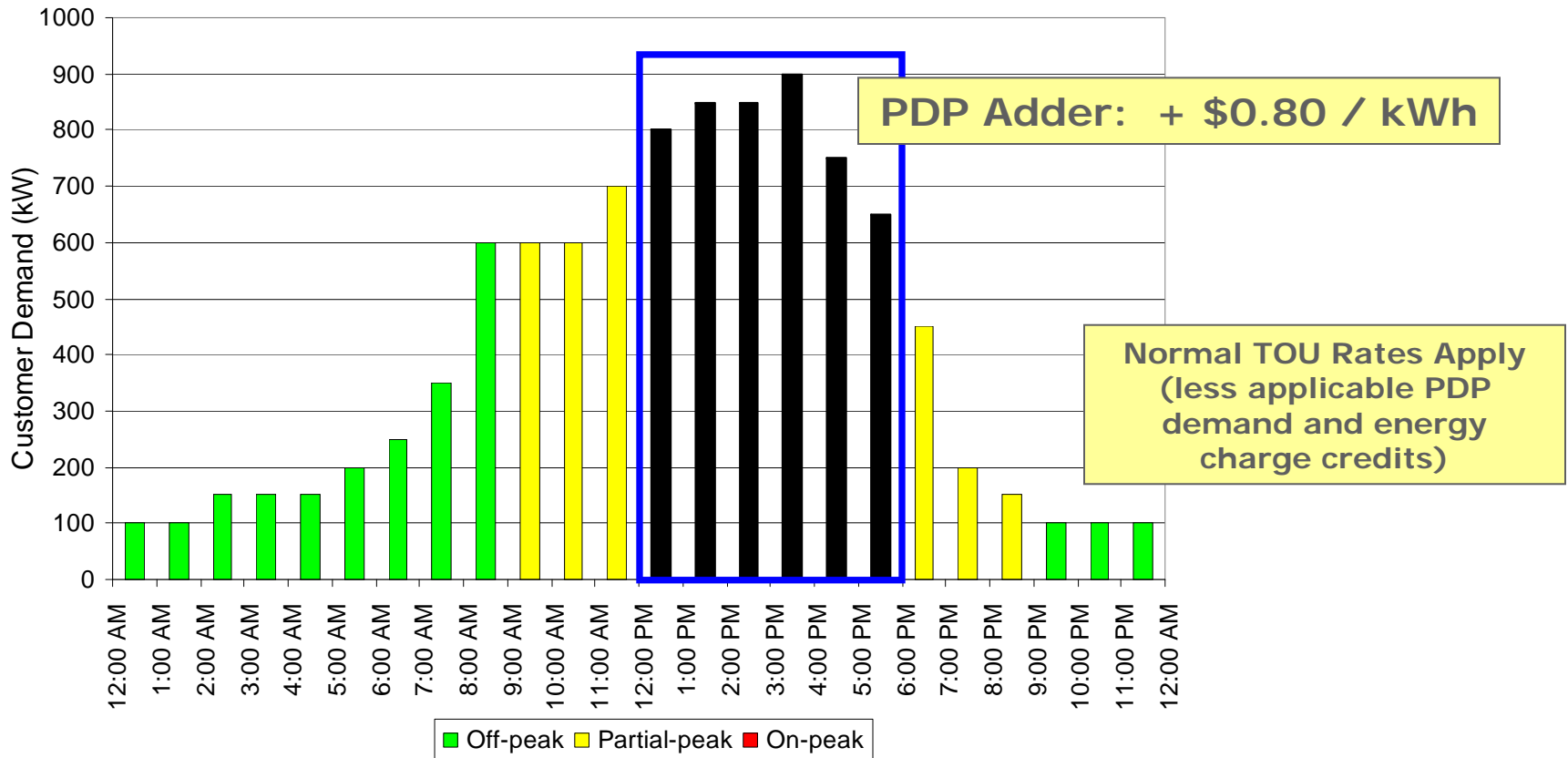
1. A10 Customers can choose 6-hour peak event periods in exchange for lower applicable PDP charges
2. Customers with A10 rates can also choose to have PDP charges apply to their usage only during every other PDP event
 - Customers choosing this option will have their applicable PDP demand & energy credits also reduced by 50%

While the Capacity Reservation Charge is not available for customers on A10 rates, there is added rate flexibility.

PDP rate design and options



A10 summer event weekday (with 6-hr option):



Note: First Partial Peak begins at 8:30am; Second Partial Peak ends at 9:30pm

PDP rate design and options



A10 credits (with every-other-event option):

Applicable TOU Rate	Summer On-Peak Demand Credit (\$ /kW)	Summer On-Peak Energy Credit (\$ /kWh)
A10T	\$2.39	\$1.470
A10P	\$2.13	\$1.470
A10S	\$2.05	\$1.407
<i>With the every-other-event option, credits are reduced by 50%.</i>		
A10T	\$1.20	\$0.735
A10P	\$1.07	\$0.735
A10S	\$1.03	\$0.704

Bill Stabilization

- In the first year the annual charge will be no greater than under their applicable TOU rate
- Customers will still be exposed to month-to-month bill volatility during the first year
- Bill will be trued-up at the end of the 12-month trial

Bill Stabilization gives customers a one-year 'safe harbor' period to facilitate the transition to PDP.

To assess your billing impact:

- Consider your tolerance for bill variance on a month-to-month basis
- Analyze the seasonality of your energy usage
- Determine your ability to respond to up to 15 events per year, including consecutive days
- Gauge your ability to reduce or shift energy usage to before 2pm or after 6pm

After considering these factors, customers should select a rate plan that best suits them.

Before May 1, 2010 select one of these options:

- Affirm transition to PDP – set up your options and notification preferences
- Opt-out of PDP – confirm your applicable TOU rate
- Sign up for demand response – participants of DR will not be eligible for default to PDP

Customers will be able to affirm or opt-out of PDP after March 1st, 2010. Customers can sign up for DR anytime.

- Ancillary Services
 - Spinning reserve provided by SmartAC switches and thermostats: Working with Lawrence Berkeley National Laboratory (LBNL)
 - Non-spinning reserve provided by C/I customers in 2009 using the Participating Load (PL) Mechanism of CAISO MRTU Release 1
- Integration of intermittent renewable resources
 - Utilizing distributed storage for load following and/or regulation (refrigerated warehouse, building pre-cooling, battery technologies): Working with Demand Response Research Center at LBNL
 - Plug-in-hybrid pilot: Working with Clean Air Transportation Department (10 site pilot involving HAN, EMS, Smart Chargers)