

Building a Sustainable Electric System

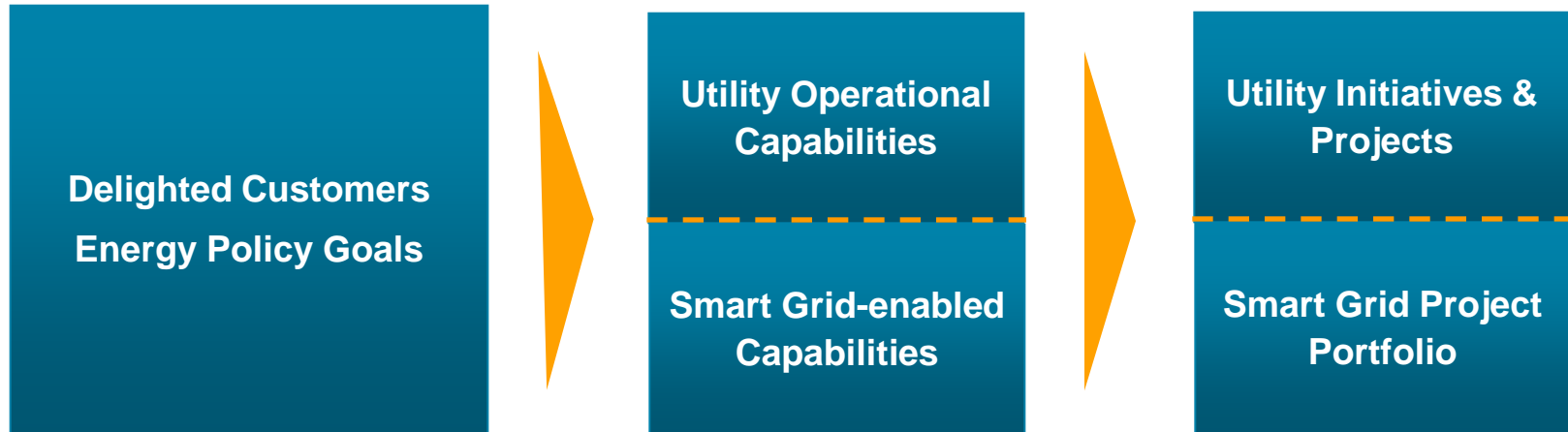


Kevin Dasso
Senior Director, Smart Grid



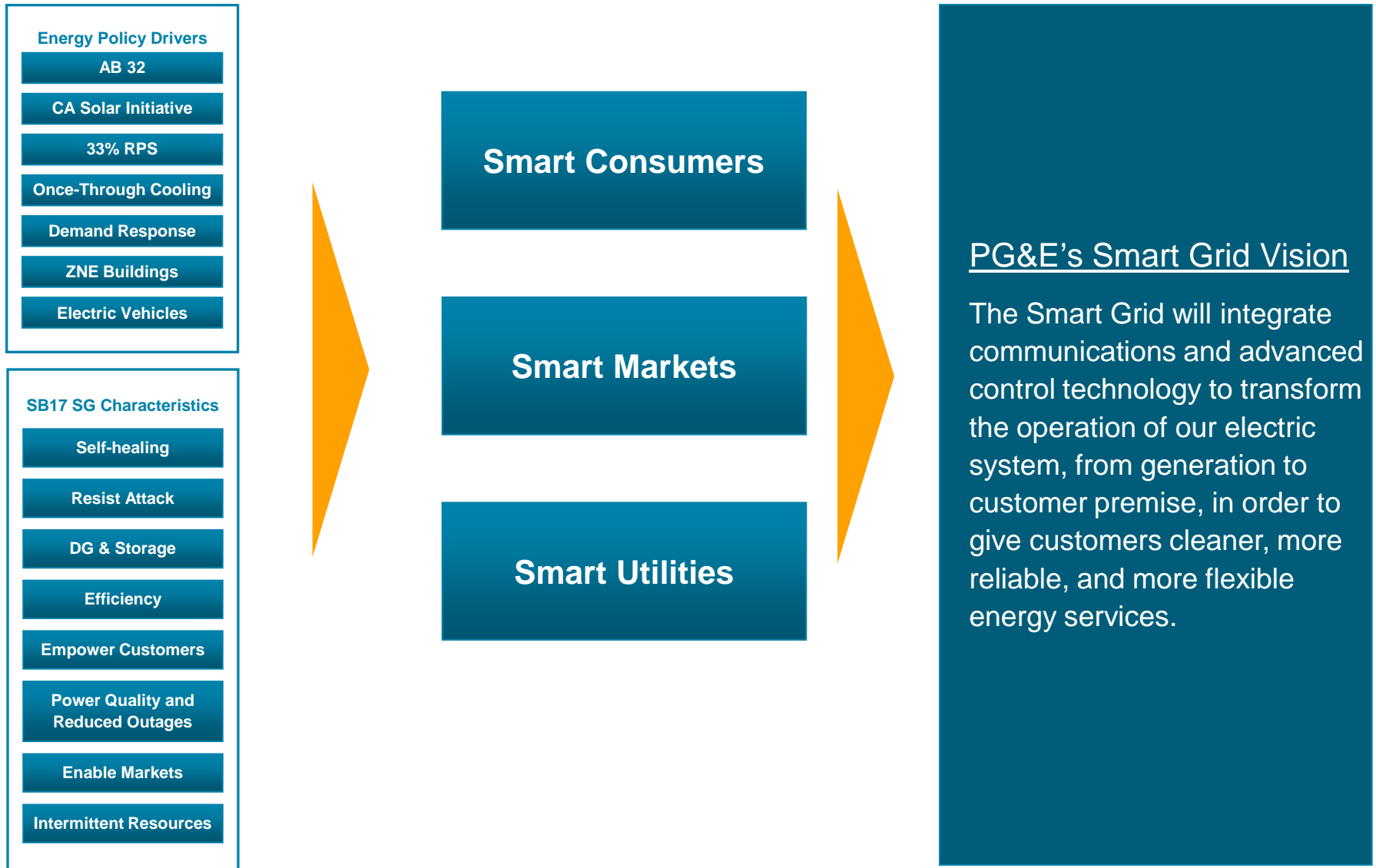
Smart Grid Context

Smart Grid is a means to achieving an end - one of many ways to achieve our goals for serving our customers and meeting policy objectives.



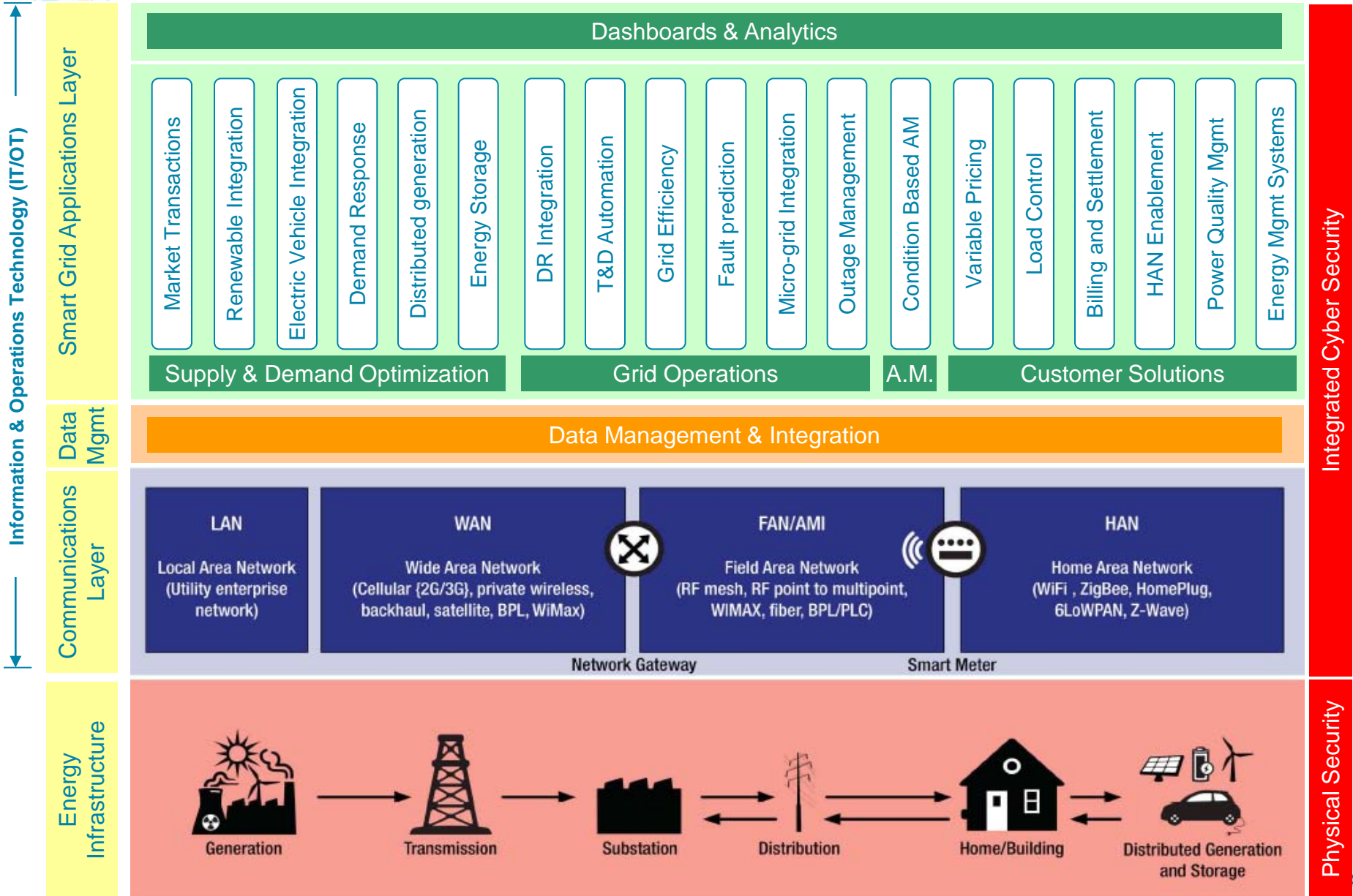


Smart Grid Vision





PG&E Smart Grid Framework





Smart Grid Strategy

Principles

- Safely, reliably, and cost-effectively support energy and environmental policy goals
- Leverage *SmartMeter* infrastructure
- Flexibility to adjust to changing policies
- Reflect starting points in terms of systems and customer needs
- Standards-based integration of non-utility products
- Reflect technology maturity and integration into operations

Investment Focus

- Directly support policy goals and customer service goals
- Core regulated investments in utility business
- Incremental investment as part of a broader telecommunications and information systems plan

Implementation Approach



Standards definition

- Shape and validate the standards that will underlie future smart-grid implementations



Testing

- Prototyping and testing of smart-grid technologies before piloting
- Accelerate technology development and ensures standards compliance early on
- Develop preliminary customer communications to support pilots



Controlled Pilots

- Implement tested technologies in a real-world but controlled setting to demonstrate value
- Work with customers to prepare for the new technologies and services



**PG&E
Service
Area in
Northern
California**



Targeted deployment

- Extend pilots to targeted roll-outs based on benefits
- Insights used to feed the next cycle of technology deployment



Potential Smart Grid Benefits

Customers

Energy awareness
Choice and control
Savings opportunities

Society

Address global warming challenge
Cleaner air, environment
New economic opportunities

Utility

Grid efficiency, reliability
Long term fuel price stability
Enhanced value / service opportunities

Deployment will be a function of funding and priority



Expanding Customer Technologies



Automated in-premise energy management



On-site generation and storage



Smart charging for electric vehicles





SmartMeter™ Program Technology Foundation

Automated meter reading for all gas and electric customers

- 7.7 million advanced meters installed;
7.0 million used for billing
- 10 million by mid-2012

Frequent meter reads

- Hourly intervals for electricity
- Daily intervals for gas

Customer benefits today and a platform for future innovation



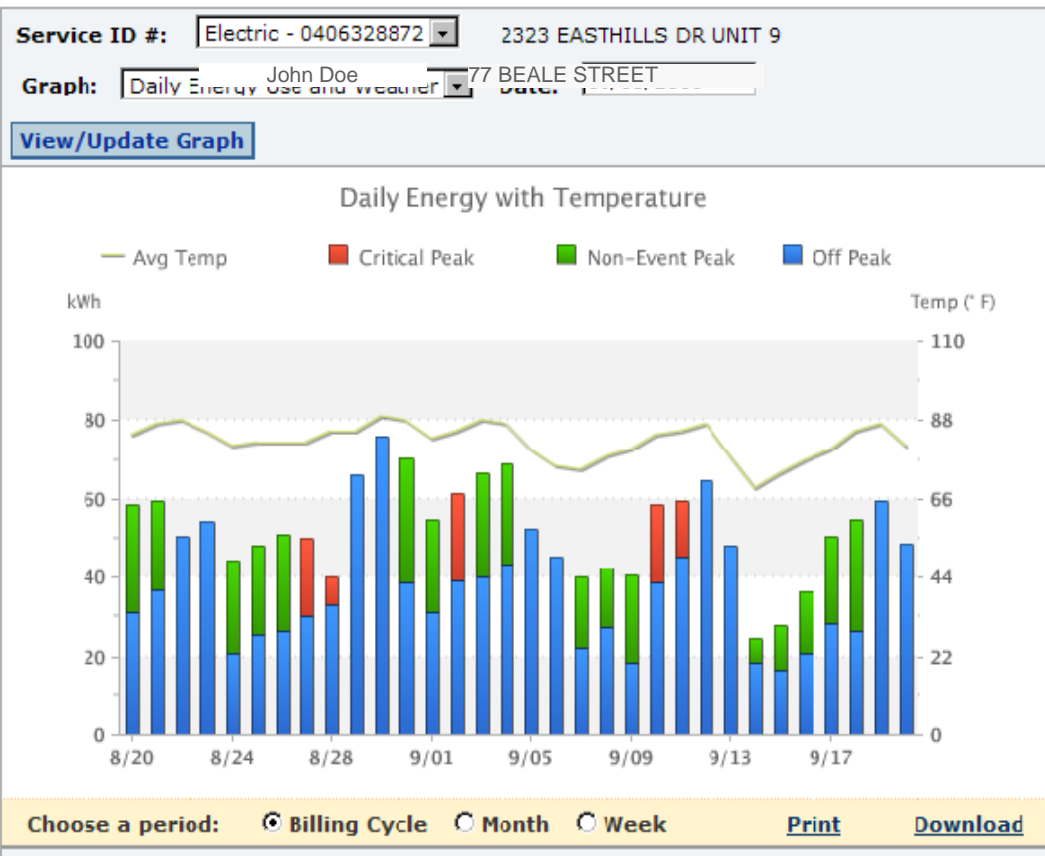


View Your Energy Use Today

SmartMeter™ Usage

Please note that SmartMeter™ usage for today will be available tomorrow between 3–10 pm.

Please be aware that the energy usage data presented here may differ slightly from the energy usage data reflected on your monthly bill. Be assured that prior to your monthly bill date, your energy usage data is validated to ensure you receive an accurate bill.



Secure customer access through PGE.com

Energy use by hour (electric) or day (gas)

View by billing cycle, month, or week

For SmartRate customers, colors designate critical peak, peak, and off-peak

Temperature overlay



Energy Alerts

Provide customers early warning of high usage

- When actual usage-to-date crosses Tier 3, 4 and 5
- When usage is forecast to cross Tier 3, 4, 5 by end of billing period

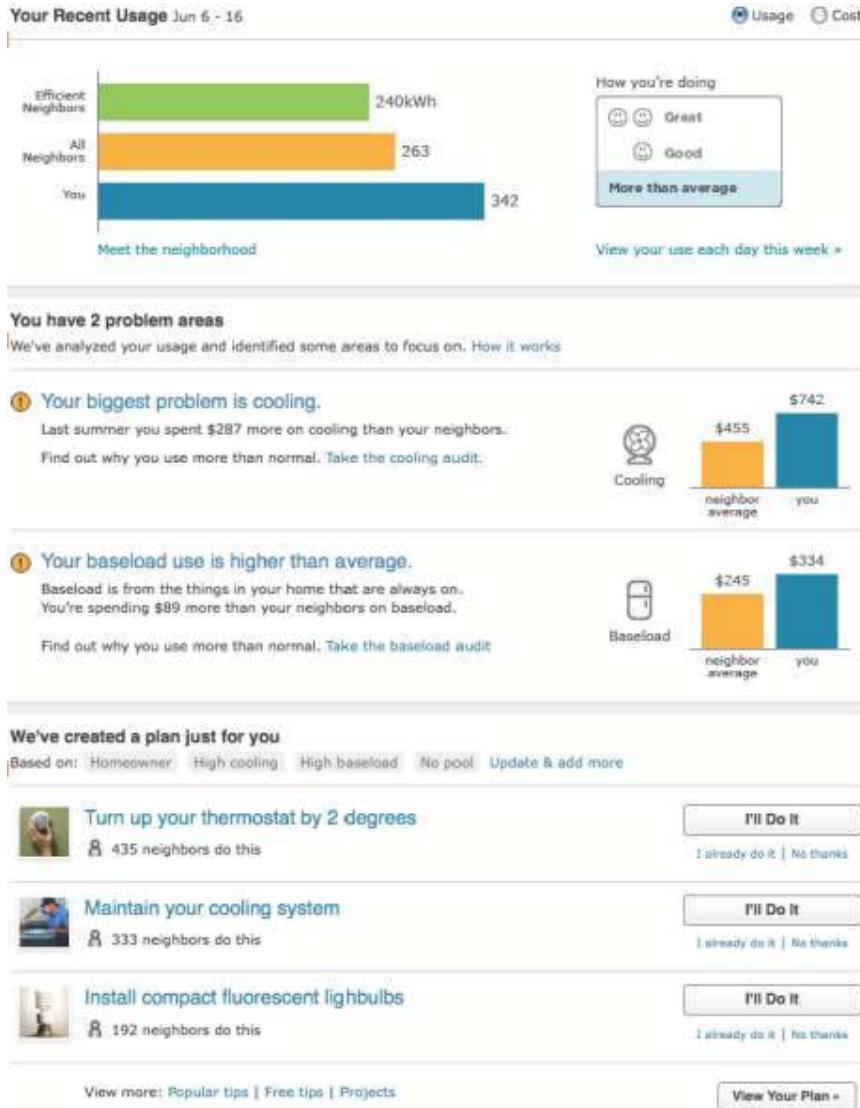
Delivered via:

- Email
- Text message
- Outbound phone call





Personalized Energy Advice



Comparative Norms



Deep Dive into Usage



Relevant, actionable tips



Expanding Customer Technologies



Automated in-premise energy management



On-site generation and storage



Smart charging for electric vehicles





Charging Loads are Significant

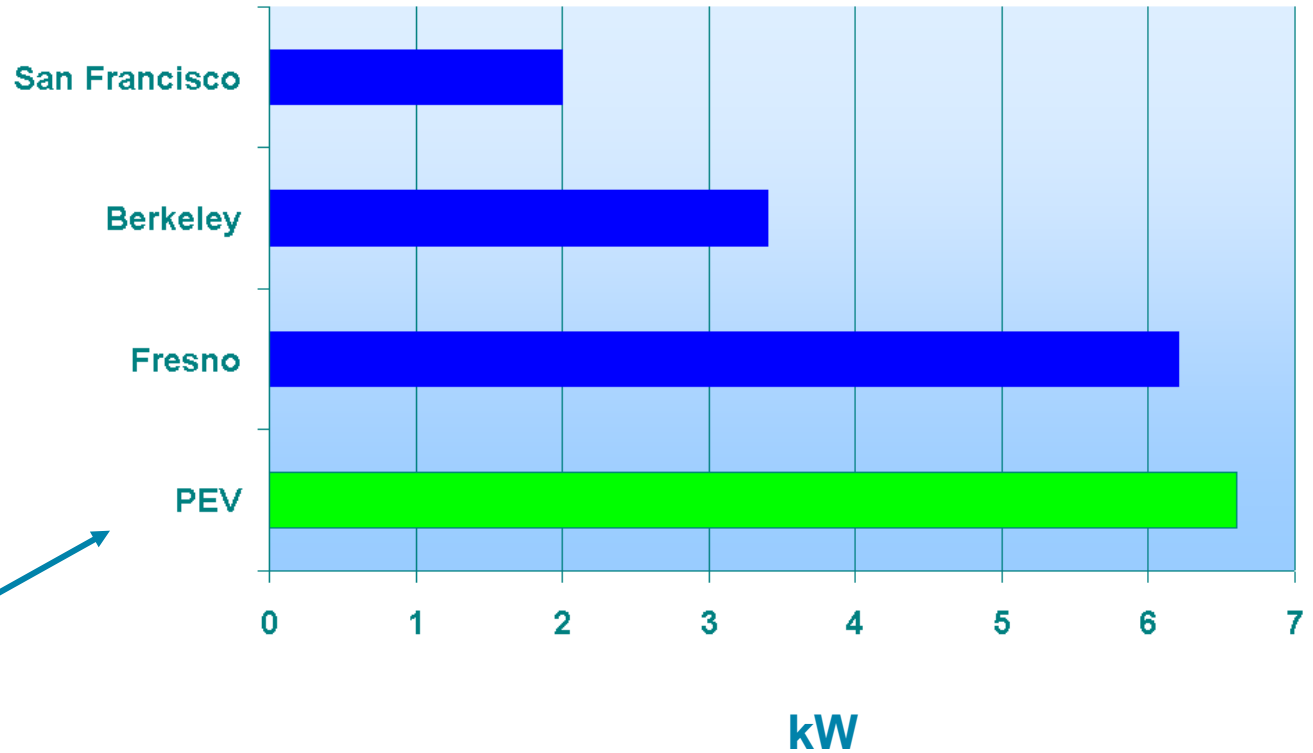
Average Residential vs. PEV Load



7.2 kW

240V/30A

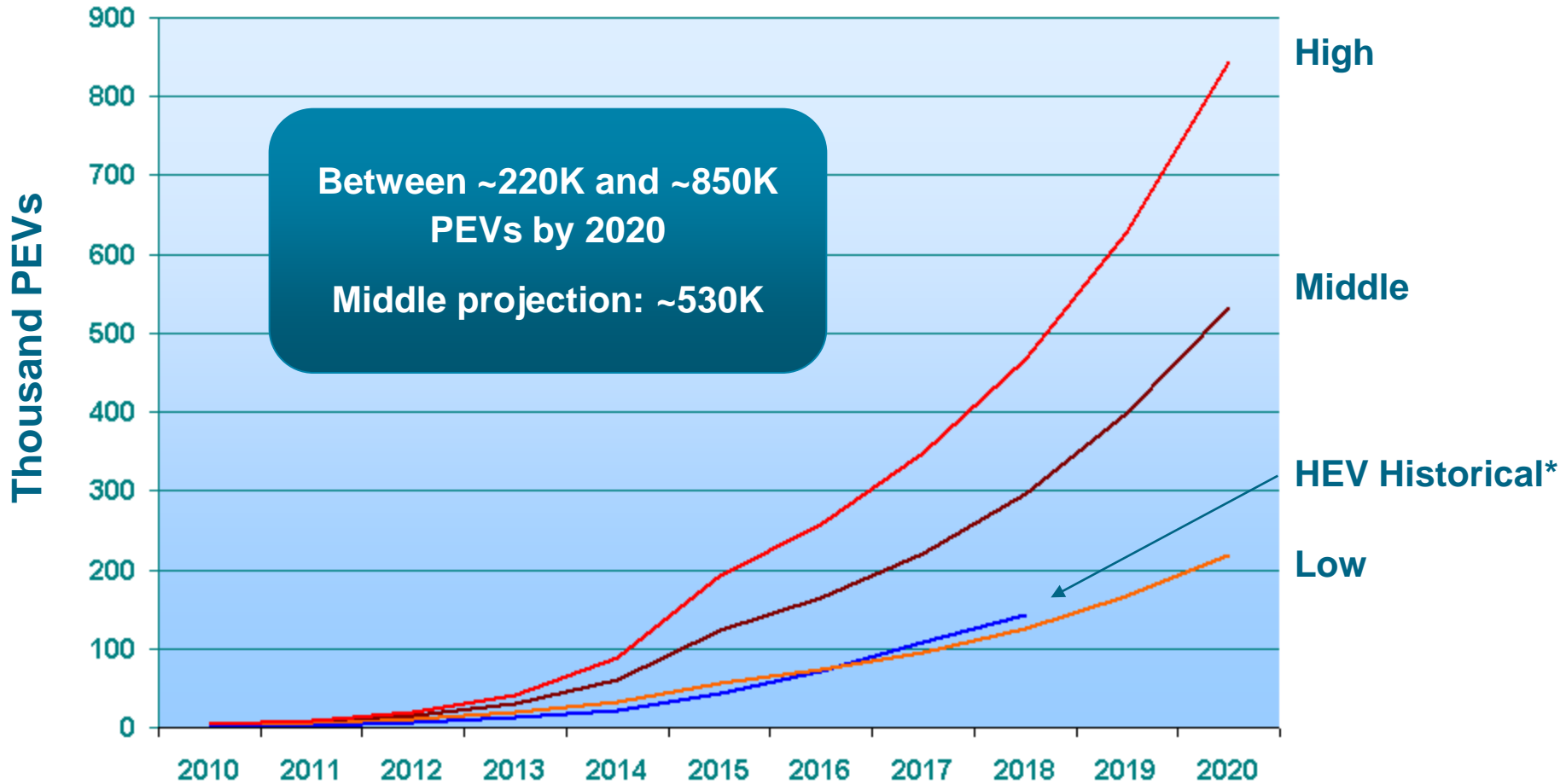
4 hours



PEV Charge = 1- 3 Homes



Projected PEV Adoption



Cumulative PG&E Service Territory PEV Market Adoption Scenarios

* Shifted 10 years forward



Study: PEV Charging Behavior, Required Upgrades



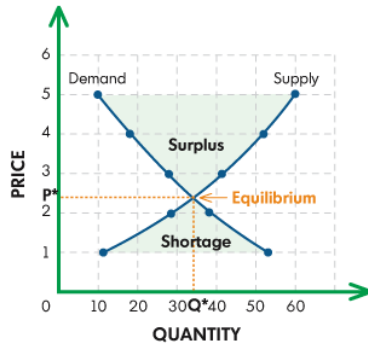
	Coast	Inland
Distribution Grid	No AC	AC
On Peak Charging	50%	10 - 60%
Off Peak Charging	10%	0%

**Required Upgrades with uncontrolled charging:
100,000 Vehicles = \$150-175 Million**



Drive PEV Charging Behavior

Markets



Contracts



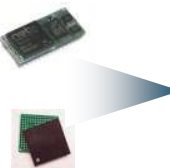
- Off-peak discounts
- Peak premiums

- Voluntary load control
- Override premiums

Automation



Wireless
Communication

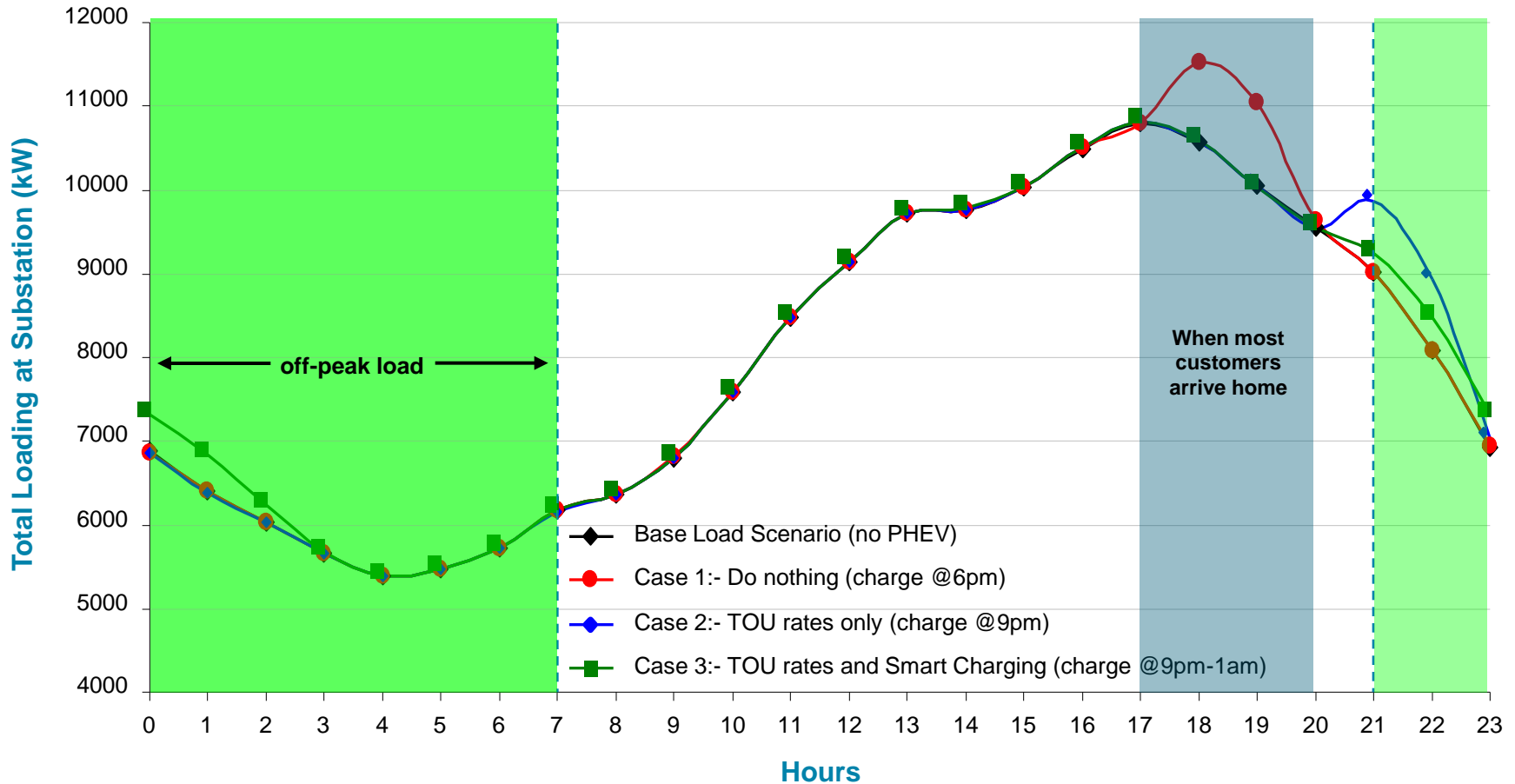


- Set and forget
- Charging coordination



Study: Influencing PEV Charging Behavior

24 Hour Total Loading of Single Feeder



Source: EPRI



At PG&E, We Are Committed To Sustainability

