

Smart Meters and the Next Generation Utility

Opportunities and Challenges

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Industry Drivers

Smart Metering & Smart Grids



Regulation

- Customer visibility on usage
- Pricing and tariff options
- Energy reduction

Green Agenda

- National, regional & global CO2 emissions targets
- Modifying consumer behaviour
- Micro-generation

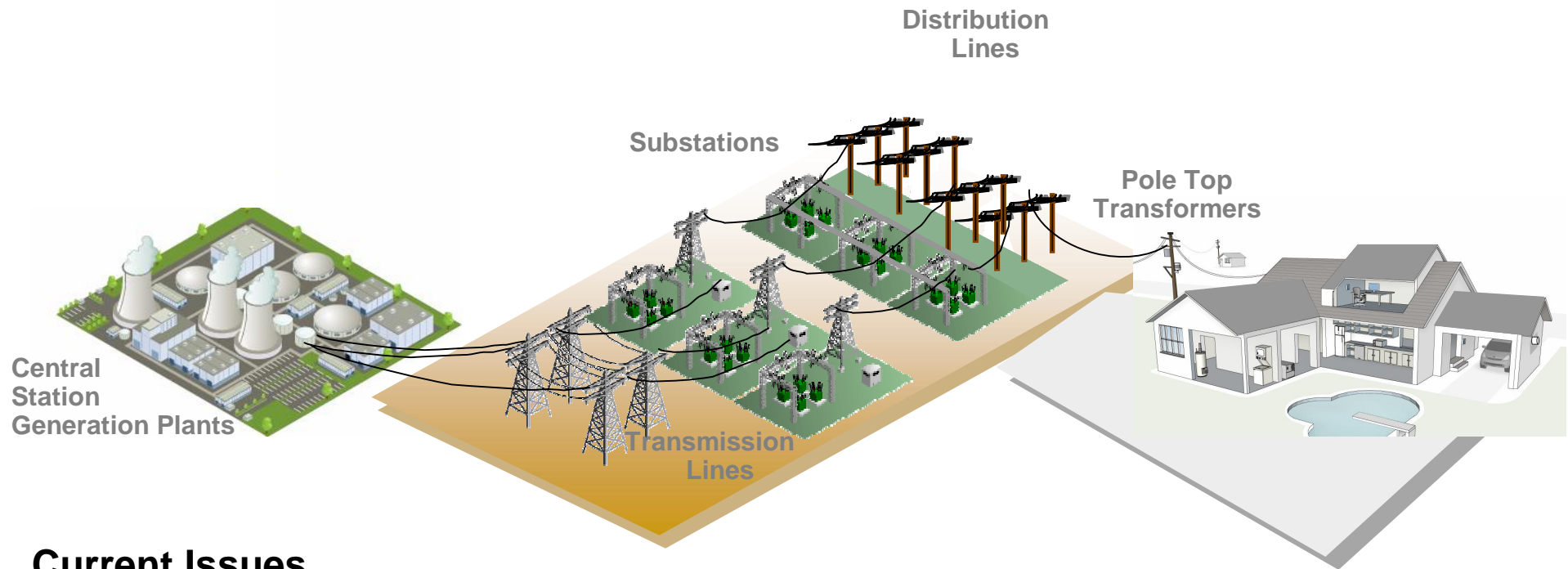
Operational efficiency & cost reduction

- Asset modernisation
- Work scheduling
- Demand response & demand forecasting

"If people do not have any idea how much energy they are using, how can you expect them to change their behaviour?"

Jonathan Stearn, Energywatch

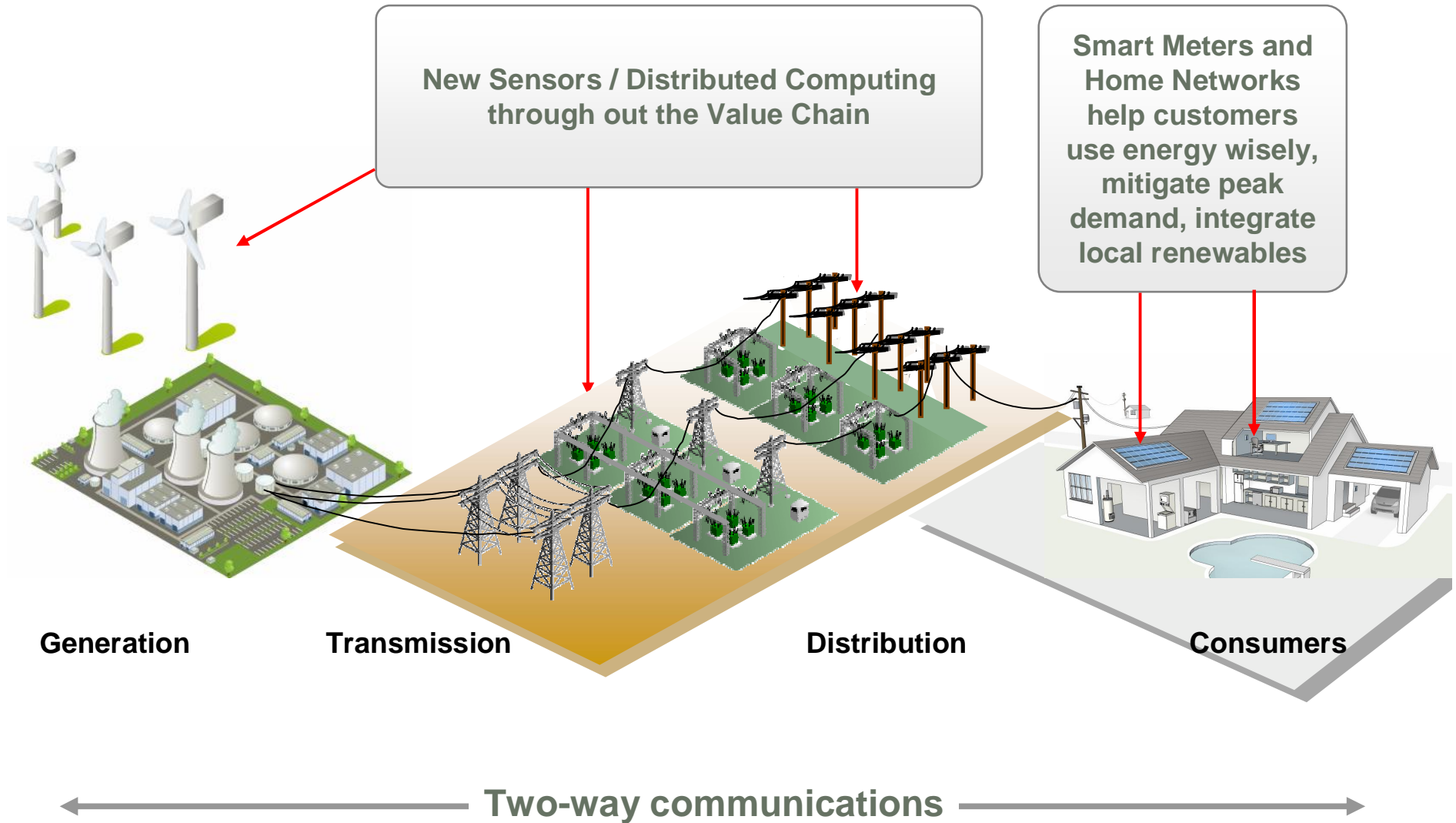
Traditional Energy Value Chain



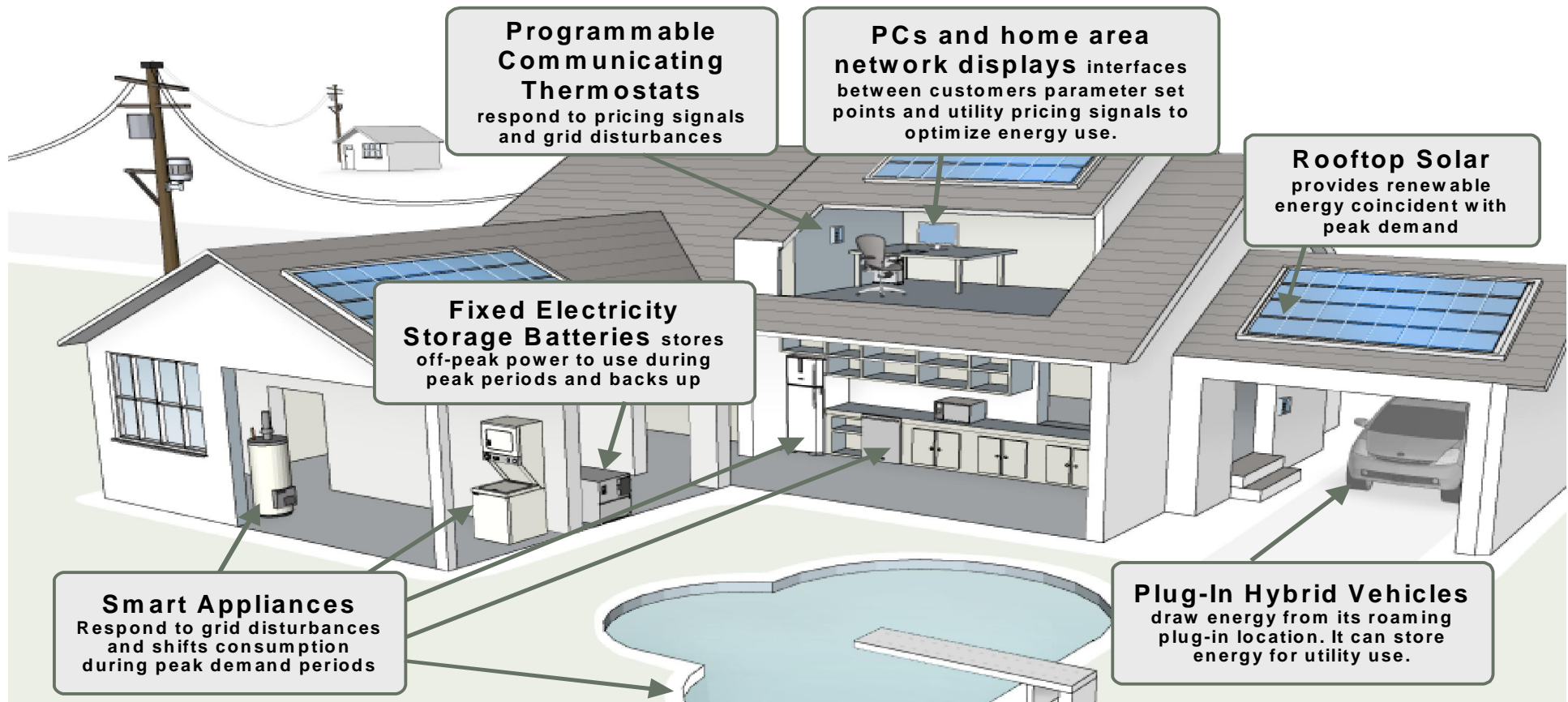
Current Issues

- Lagging investment in central plants and transmission
- Existing infrastructure can't deal with peak demand growth & local generation
- Limited customer interaction and choice
- Increased consumer and commercial interest in climate change
- Need to improve operational efficiency & reduce costs

The Smart Grid:



The Smart Home



Smarter Metering & Smarter Grids

Benefits for Consumers

- Information portal
- Taking ownership of usage trends
- Pro-active advice from suppliers
- Optimise tariffs
- Self-service
- Budget visibility
- New home services
- Ease of supplier switching
- Carbon footprint tracking

Benefits for Network Managers

- Theft detection
- Technical losses identification & reduction
- Distributed/micro- generation integration
- Advanced mobile workforce
- Advanced outage management
- Asset maintenance & optimisation
- Quality of Service reporting
- Network planning

Benefits for Suppliers

- No more 'Estimates'
- Improved customer relations and lower cost to serve
- Innovative tariffs – DR/DP – custom pricing
- Improved customer enrolment
- New services
- Improved energy sourcing operations (including Settlements)
- Enhanced Self- Service
- New generation prepayment

Everyone wins! (fingers crossed)



Smart Metering & Grid Challenges

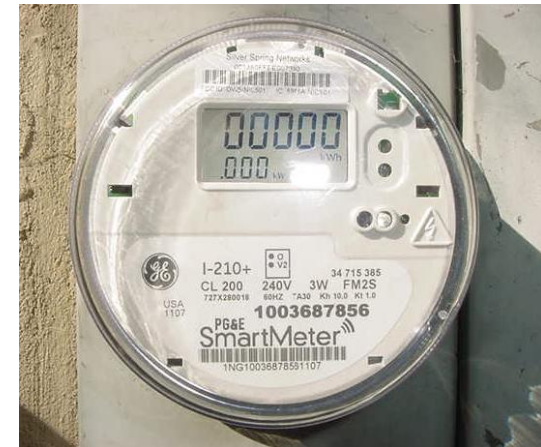
- Targets and time scale
- Lack of clarity on communications model
- Fundamental change to business and operating models
- Business case for utilities to do something
- Standards for smart meters, Lan & Wan
- Data ownership and privacy
- Real time data volumes
- Demanding qualities of service
- Large complex system integration
- Solution future proofing against evolving requirements



Smart Grid Foundation: Largest US Smart Meter Deployment



- n Automated meter reading for all customers
 - n 10 million meter upgrades by 2011
- n Frequent meter reads
 - n daily for gas (collecting hourly for gas)
 - n hourly or 15 minute intervals for electric
- n Enhanced customer energy management



Greatly Expanded Data Demands

Old World

- n Once a month relationship with 6 million customers
- n 5 million electric meter reads a month
- n 5 million gas meters reads a month
- n 7 years of historical data

New World

- n Once an hour relationship with 6 million customers
- n 3.6 billion electric meter reads month, plus 150 million electric status reports a month
- n 3.6 billion gas meter reads month, plus 150 million gas status reports a month
- n 7 years of historical data (3 years online, 4 years archived)



Represents a 300x increase in storage

Online Energy Use Information



- n Secure customer access through PGE.com
- n Displays energy use by billing cycle, month, or week
- n Displays hourly electric use by day
- n Customer service reps able to view same graphs online

The screenshot displays the PGE Customer Service portal. The header includes the PGE logo, the company name "Pacific Gas and Electric Company", and the "Customer Service" title with "GET HELP | LOGOUT" links. The user's name "Michael Smith" and account number "123456789-0" are shown, along with the service address "100 Main St., San Francisco, CA 94111".

The left sidebar contains navigation links: "My Account", "Billing" (with sub-links for "View Bill", "Pay Bill", "Billing/Payment History", and "Usage History"), "Financial Assistance", "Save Energy and Money", "Service Requests", "My Profile", and "PGE.com Home".

The main content area is titled "SmartMeter™ Usage" and includes a brief explanation of the feature and a "View/Update Graph" button. Below this, there are dropdown menus for "Meter" (set to "Electric-1234VBS"), "Graph" (set to "Daily Energy With Temperature"), and "Date" (set to "Mar 2008 | 1").

The graph, titled "Daily Energy with Temperature", shows energy usage in kWh on the left y-axis (0 to 37.5) and temperature in °F on the right y-axis (0 to 110). The x-axis represents dates from 5/15 to 6/11. The data is presented as a stacked bar chart with four categories: "Avg Temp" (yellow line), "On Peak" (red bars), "Non-Event Peak" (green bars), and "Off Peak" (blue bars). The "On Peak" usage is notably higher during the warmer days of the period.

At the bottom of the graph area, there are options to "Choose a period:" with radio buttons for "Billing cycle" (selected), "Month", and "Week", along with "Print" and "Download" links.

Below the graph, a disclaimer states: "The data presented in this chart may slightly differ from the data reflected on your bill for several reasons. For example, data collected on your account may include some estimated usage, and this chart may round your energy usage differently."

There is also a section titled "Hot days bring about a cool way to shift energy and manage costs." which introduces a voluntary electric pricing plan and provides a link to "SmartRate™ Program Info" and "Energy Efficiency Tips".

At the very bottom, a small note states: "SmartMeter™ is a trademark of SmartSynch, Inc. and is used by permission."



SmartRate: Empowering Customers, Cutting Peak Loads

SmartRate makes sense this summer.

SmartRate works with our advanced technology SmartMeter™ metering collection system to help you shift or reduce energy during peak usage hours on 15 of the hottest days of summer, what we call SmartDays™.

Between May 1 and October 31 PG&E will designate up to 15 SmartDays, which will always occur on a weekday. You'll be notified via phone, email or both of upcoming SmartDays by 3 p.m. the day before, giving you time to plan ahead.

SmartRate also provides you easy access to your daily energy usage online at www.pge.com so you can monitor your progress.

In short, you'll have more control over your energy costs, as well as, how much you shift or reduce your energy usage during peak times.

SmartRate is risk free.

To ensure that SmartRate doesn't cost you any extra, PG&E is providing an additional incentive, bill protection during the first year.

If your bills during the summer months are higher than they would have been on your current plan, PG&E will reimburse you the difference in November.

You also have the ability to opt out of the pricing plan any time at no charge just by calling 1-866-743-0263. You will revert to your old plan, that may appear on your next bill statement.

You are in control.

If you're proactive about shifting your energy use, you could save 5-10% on summer electricity.

For some basic ideas on how to get started, see the tips provided below. For more information, or to sign up for SmartRate, just go to www.pge.com/smartrate.

Some tips for getting the most out of SmartRate.

We know you're already doing a lot to help conserve energy. But it's easy to save even more electricity, and help the community in the process. Here are some simple tips on how to shift usage on SmartDays:

- Pre-cool your home in the morning, then use less AC in the afternoon by raising your thermostat, for instance, from 76° to 80°.
- Wash and dry laundry in the morning or after 7 p.m.
- Use the dishwasher in the morning or after 7 p.m.
- Turn off unnecessary lights
- Turn off and unplug electronics, computers and chargers when not in use
- Shift pool pump/filter use to off-peak hours

Recruitment

- n 10,000 voluntary participants in summer 2008

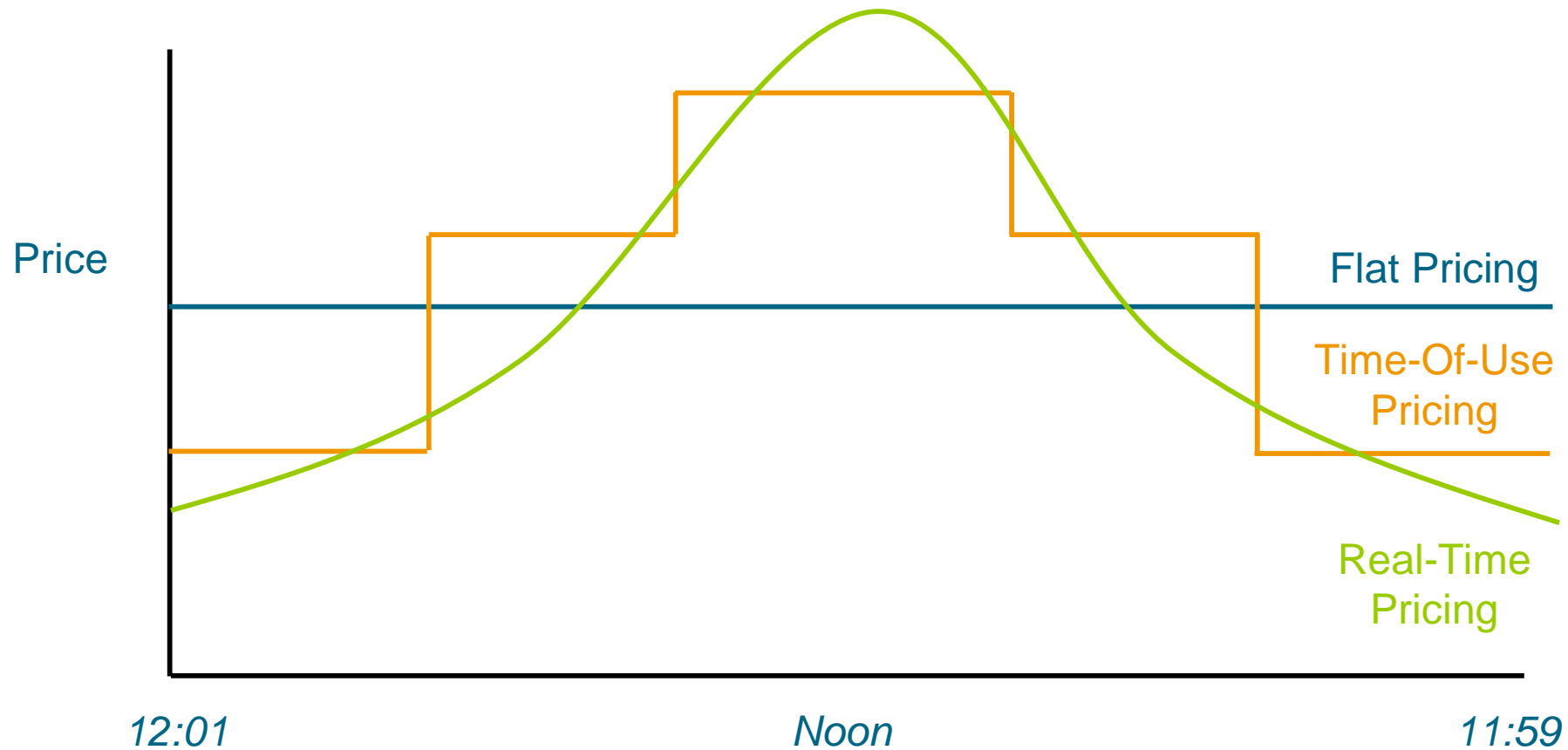
Experience

- n Across 9 called events, the average residential customer achieved a reduction of **16.6%**
- n 7 of 10 customers saw a reduction in their cumulative summer bills

Retention

- n 90% of customers intend to stay on the plan in 2009

Time-differentiated pricing



Encourage smarter energy use by exposing customers to the real marginal cost of electricity



Conclusions

- Strong drivers exist for smart meters and grids
- Smart metering is the first step in a fundamental change in the way utilities will operate in the future
- Significant barriers to adoption exist today
- The UK Government needs to provide clarity on the communications model
- Utilities are holding back today
- Smart metering represents a significant opportunity for all stakeholders and parties