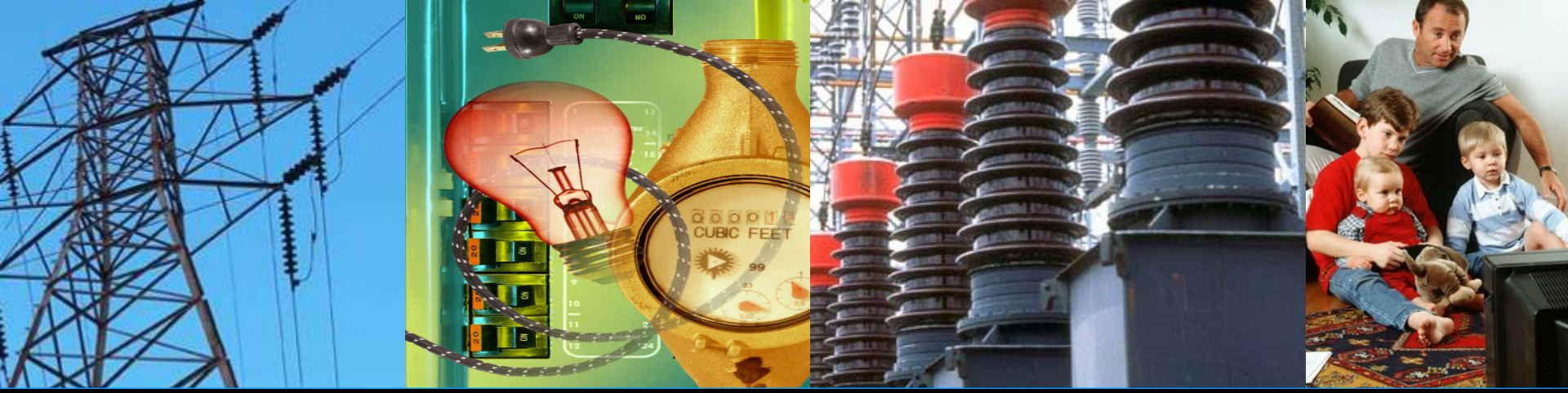

WILL THE SMART GRID PROMOTE SMART CUSTOMER DECISIONS?

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The Smart Grid enables energy efficiency and demand response

- Rising fuel prices and capacity costs, shrinking reserve margins and greenhouse gas emissions are setting the policy maker's agenda today
- Utilities and state commissions are placing a renewed emphasis on the demand side of the equation to deal with these issues
- Both energy efficiency and demand response can play a vital role in meeting future customer energy needs while controlling rising bills and making sure the lights stay on
- The Smart Grid opens new vistas when it comes to dealing with tomorrow's customers who will be born into the digital age

In the new century, we need a multi-faceted approach for reaching the customer

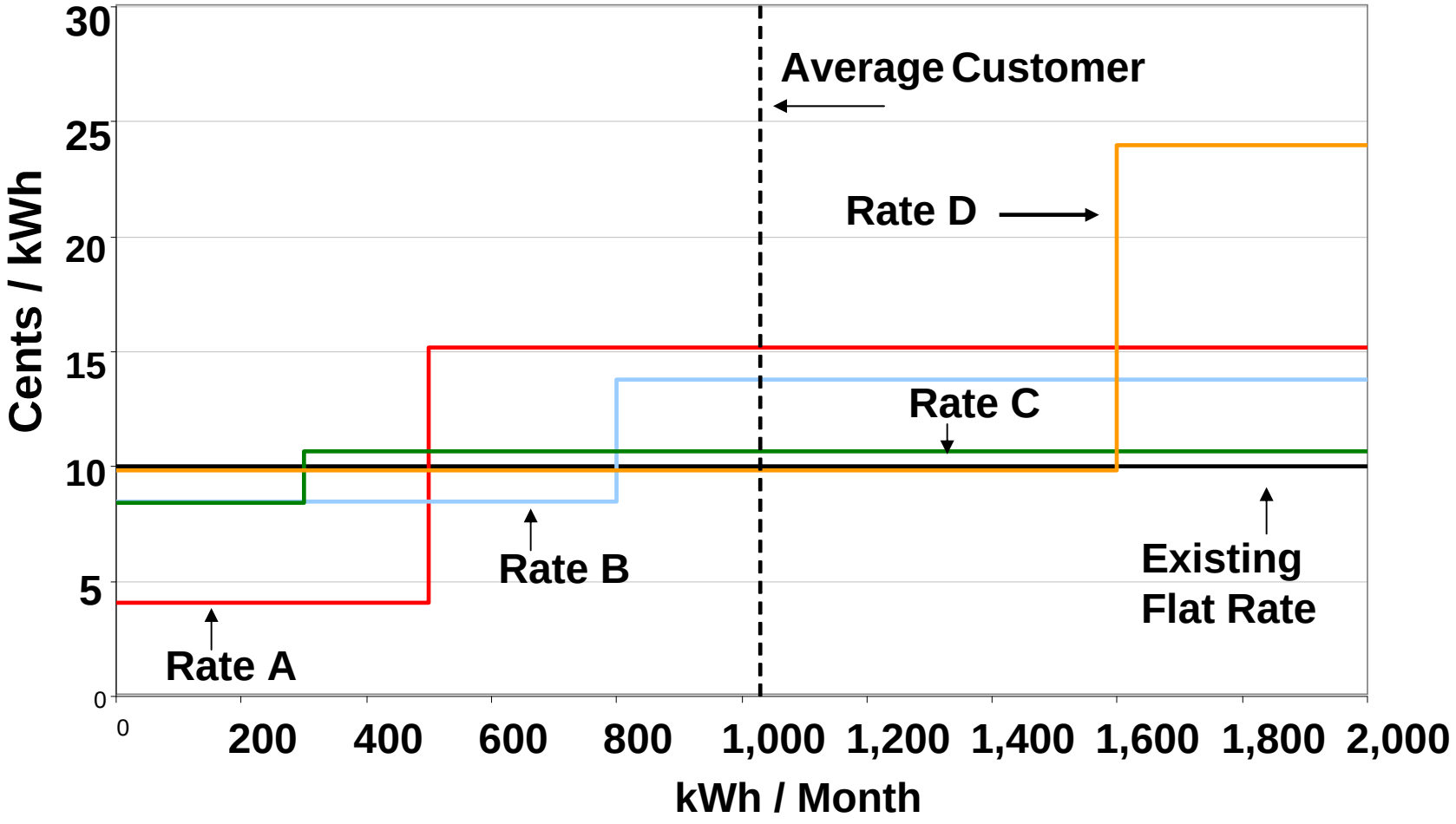
- **Information** about energy costs as they are incurred and ideas on how to manage those costs
- **Codes and standards** for new appliances, buildings and industrial processes
- **Enabling technologies** that control costs in real-time conditions such as two-way communicating thermostats
- **Rebates and financing** for accelerating the adoption of smart end-use technologies
- **Smart rate design** such as inclining block rates and dynamic pricing rates

The smart grid will help customers make smart energy buying decisions

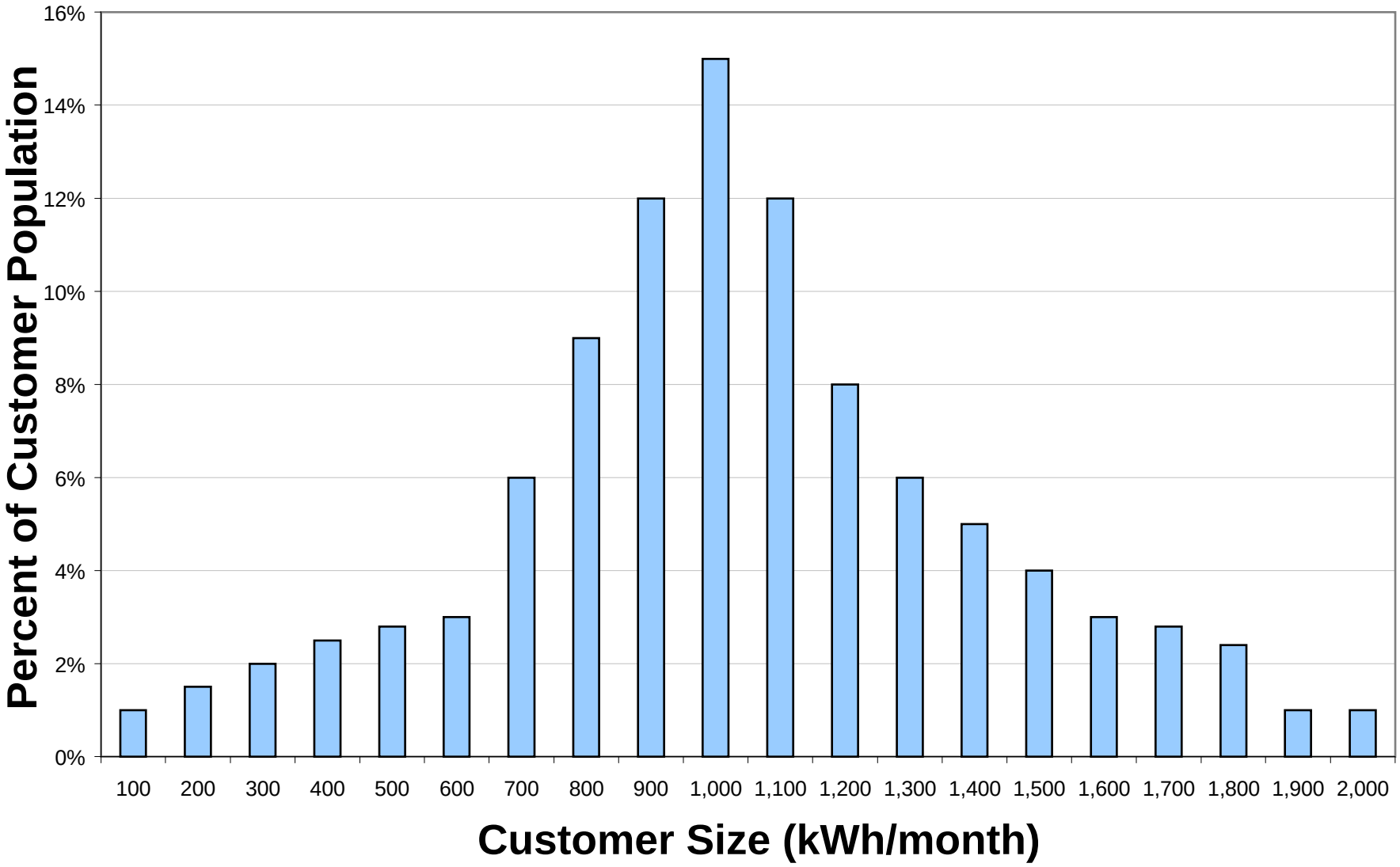
- Providing real-time feedback to customers on their energy consumption should help them better manage their energy behavior
- New empirical evidence from a number of pilots shows that in-home displays and similar devices that are enabled by the smart grid can lower energy use by up to 6 percent
- This has been observed to happen even with existing rate designs
- Of course, greater impacts will be observed if the rate designs are changed as well

What will be the likely impact of inclining block rate designs?

Four illustrative inclining block rate designs



Representative customer billing distribution

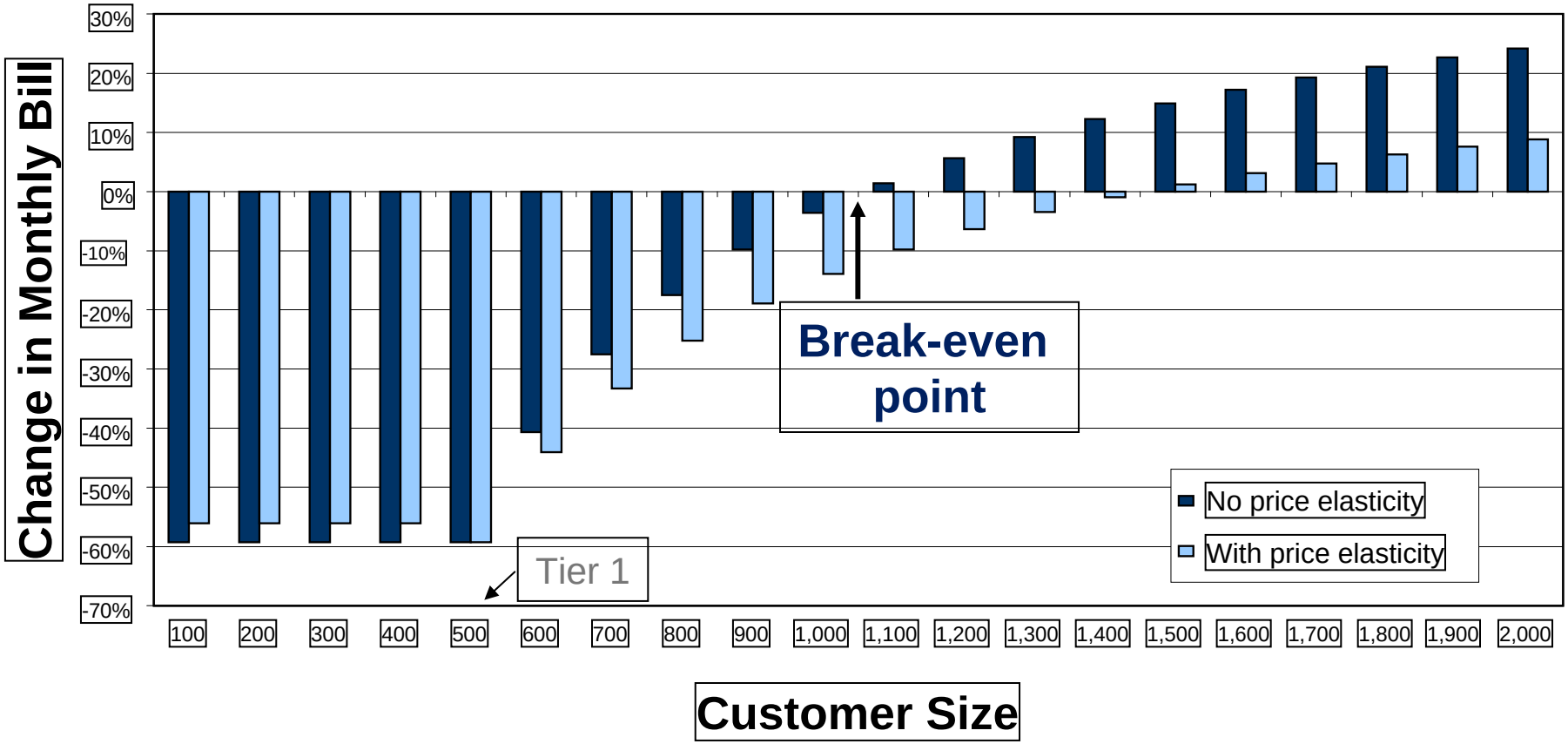


Energy use could decline by up to 5.9 percent and customer bills by up to 9.1 percent

Price Elasticity		Avg Percent Change in Usage			
		Rate A	Rate B	Rate C	Rate D
Short Run	**Mean**	**-5.9%**	**-2.2%**	**-1.0%**	**-0.5%**
	Std Dev	2.0%	0.8%	0.3%	0.2%
Long Run	**Mean**	**-18.4%**	**-6.7%**	**-3.1%**	**-0.7%**
	Std Dev	6.5%	2.4%	1.1%	0.4%

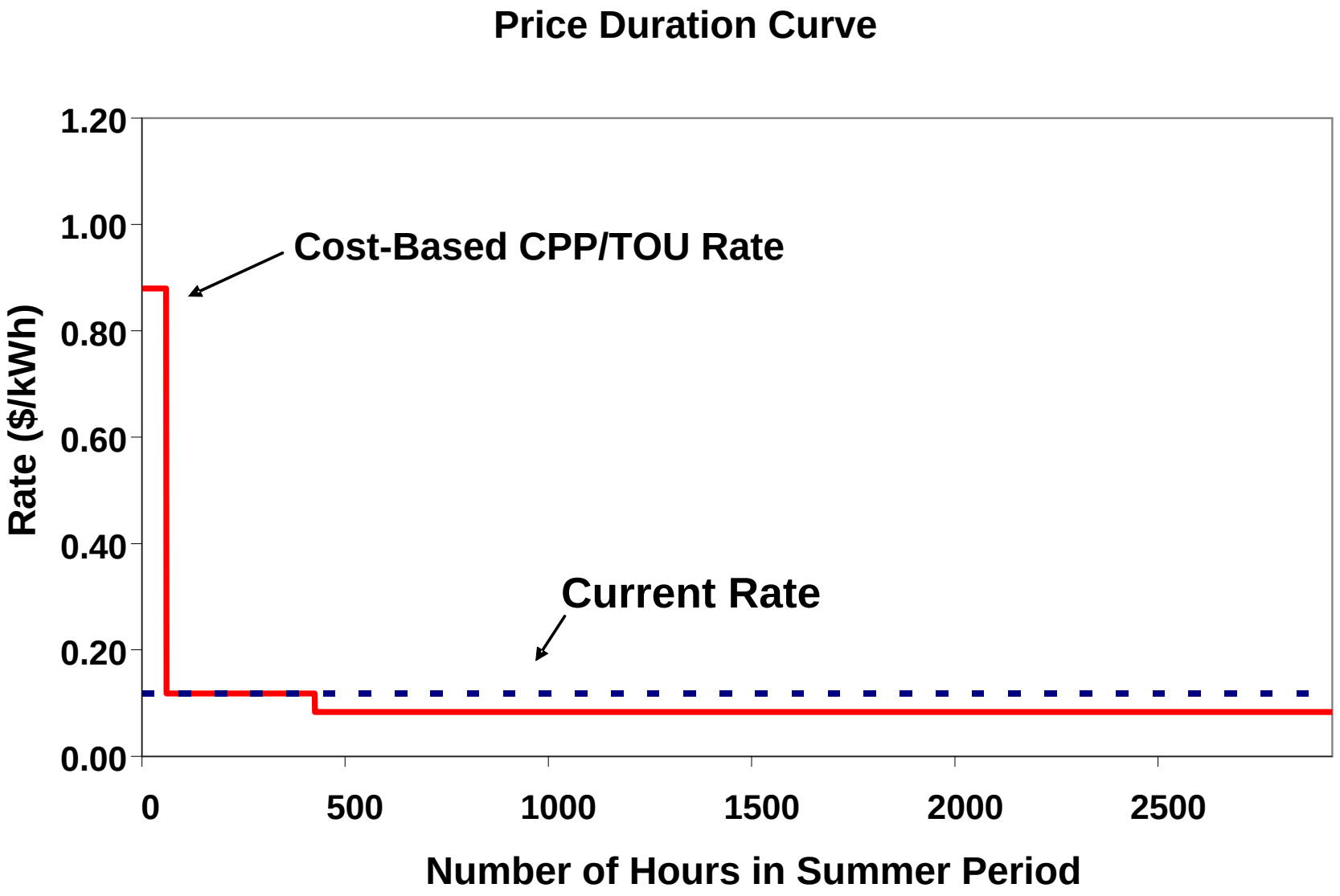
Price Elasticity		Avg Percent Change in Class Revenue			
		Rate A	Rate B	Rate C	Rate D
Short Run	**Mean**	**-9.1%**	**-3.1%**	**-1.0%**	**-1.4%**
	Std Dev	3.1%	1.1%	0.4%	0.5%
Long Run	**Mean**	**-28.4%**	**-9.4%**	**-3.3%**	**-2.6%**
	Std Dev	9.9%	3.4%	1.1%	1.0%

Price response mitigates the impact on high use customers by shifting the breakeven point

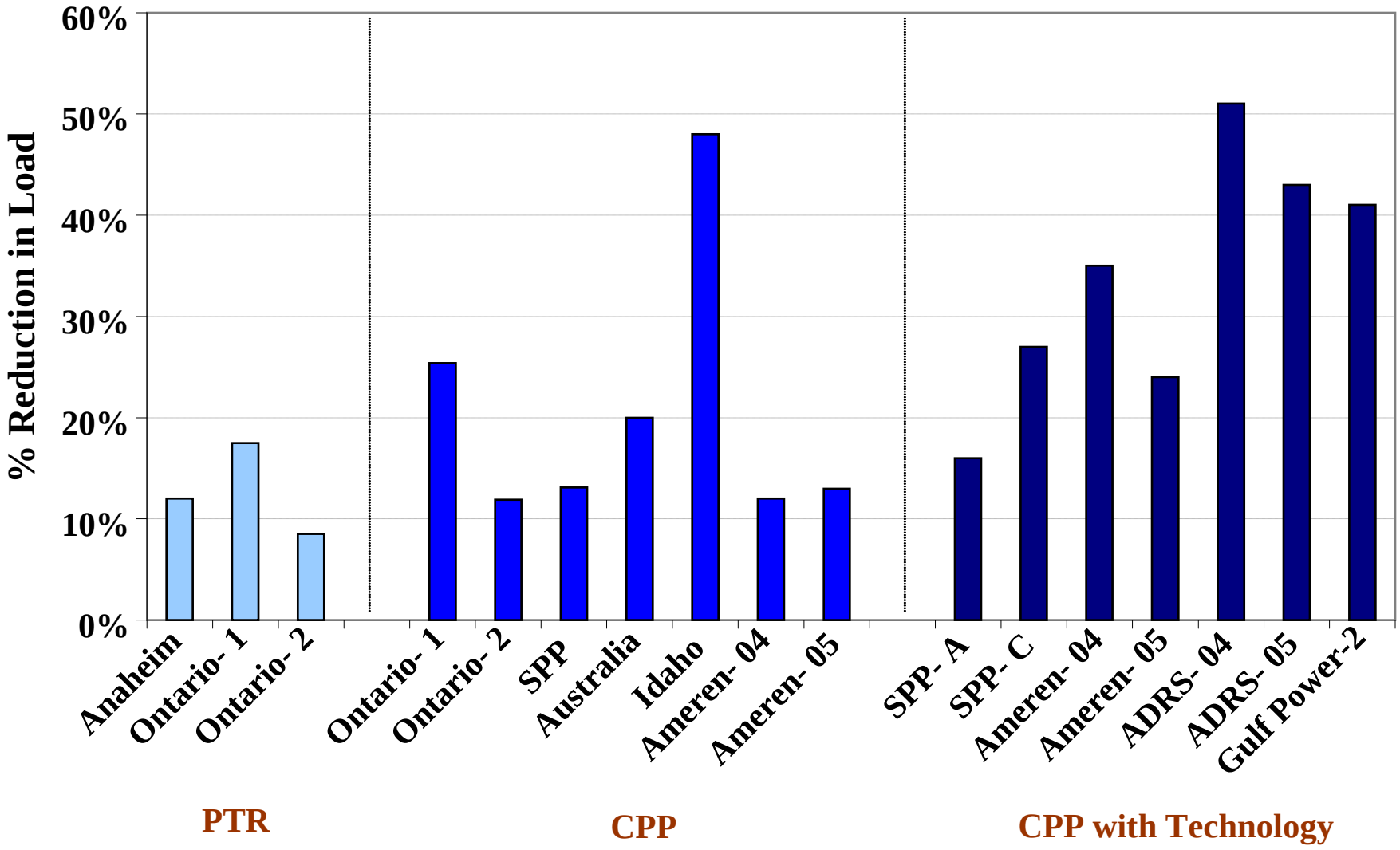


What will be the likely impact of dynamic pricing rate designs?

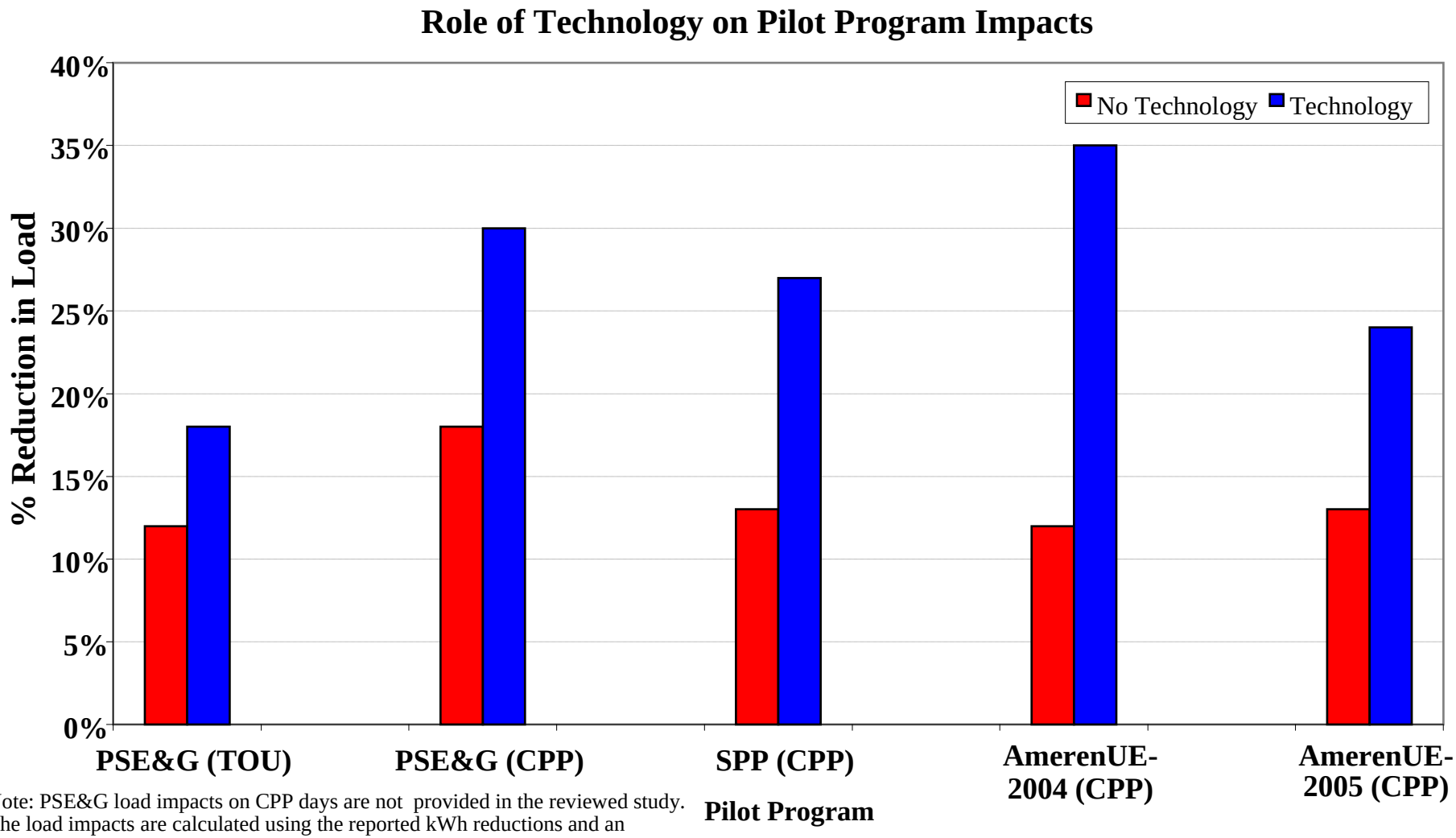
An illustrative dynamic pricing rate design



Customers respond to dynamic pricing

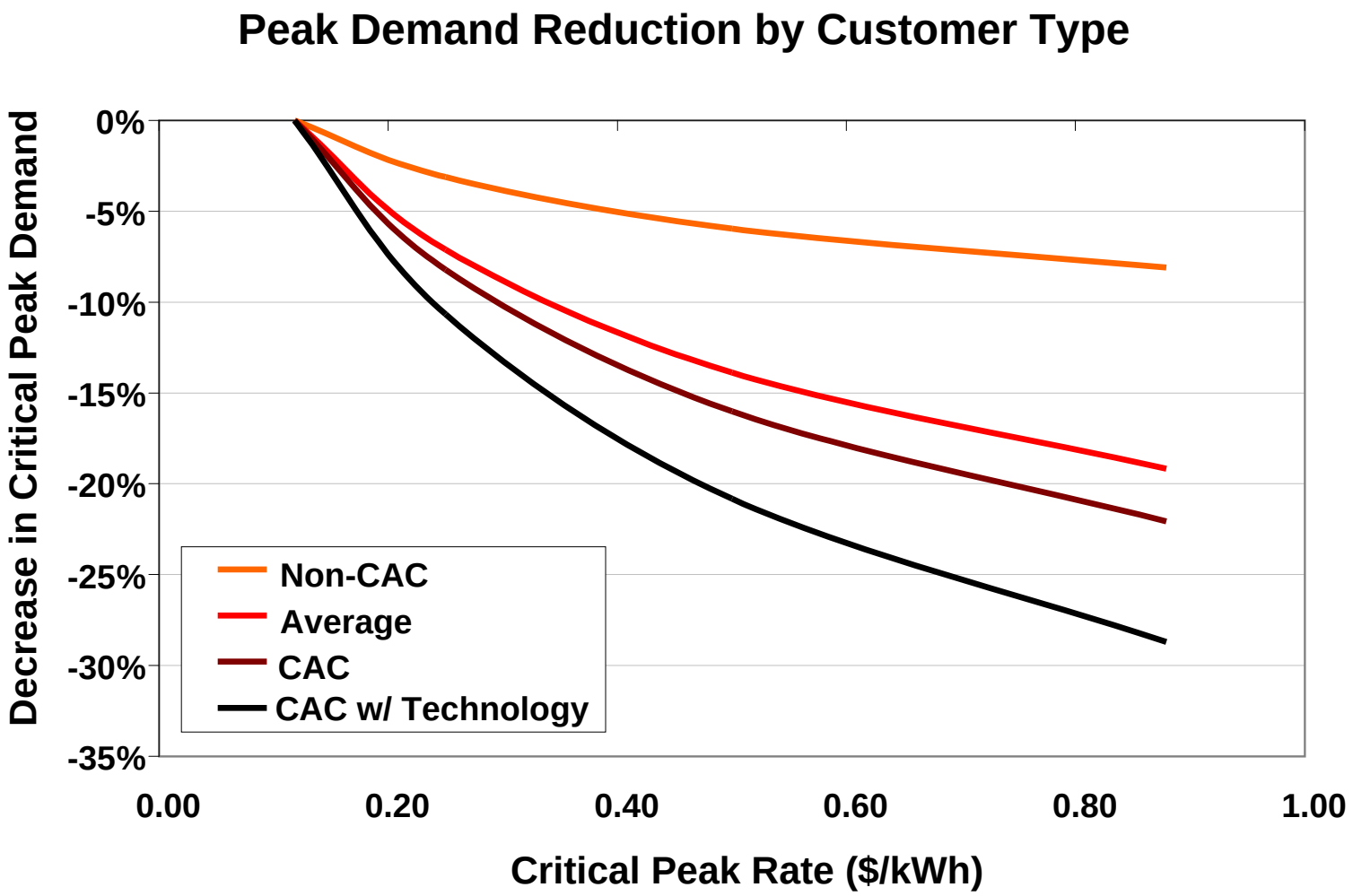


Enabling technologies magnify demand response

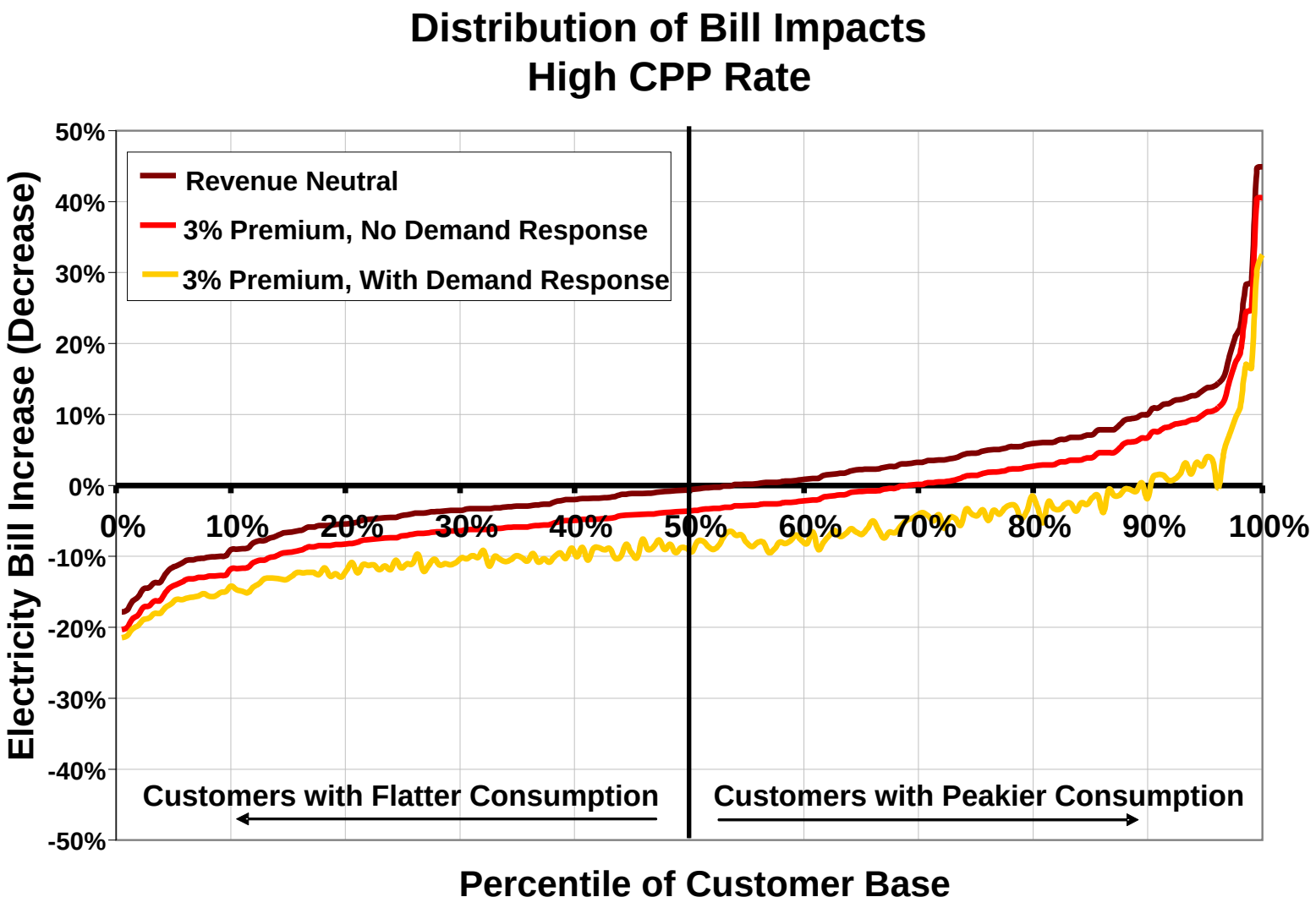


Note: PSE&G load impacts on CPP days are not provided in the reviewed study. The load impacts are calculated using the reported kWh reductions and an estimate of consumption during peak on CPP days.

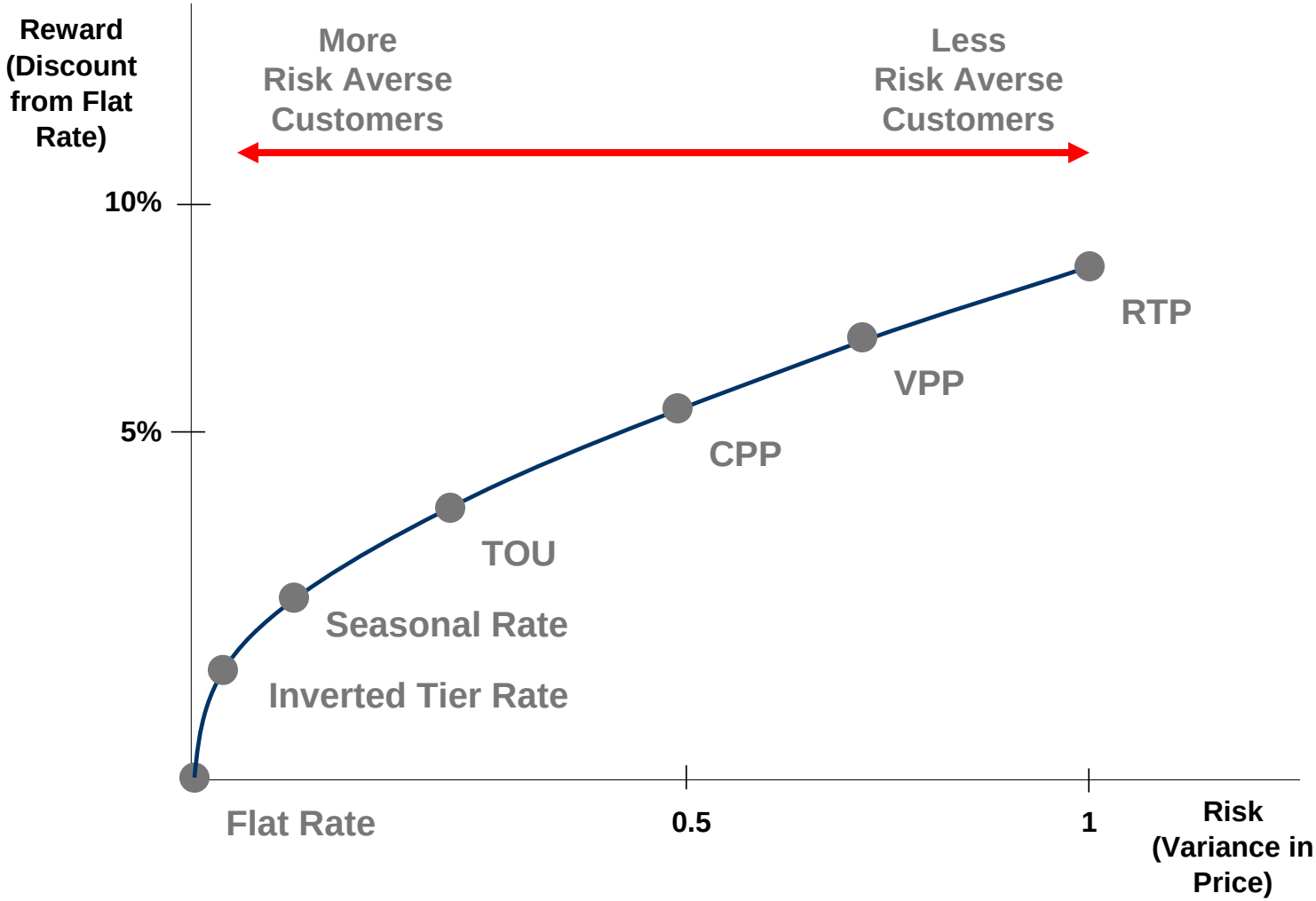
Customer response in the mass market varies by segment



Crediting customers for the hedging premium broadens the appeal of dynamic pricing



The way forward is to offer customers a menu of pricing options



The smart grid enables smart energy buying decisions

- Providing real-time feedback to customers can lower energy use by a few percentage points
- Inclining block rates can reduce energy consumption by up to 6 percent in the short run and may additionally lower peak demand
- Dynamic pricing rates can reduce demand by 13 to 27 percent during critical peak periods
- Taken together, these measures can make a substantial contribution to meeting Indiana's future energy needs at a reasonable cost

The digital library

- **Ahmad Faruqui, "Retooling Rate Design for Energy Efficiency," forthcoming, Public Utilities Fortnightly, August 2008**

- **Ahmad Faruqui and Sanem Sergici, "The Power of Experimentation," Discussion Paper, The Brattle Group, May 11, 2008** (Downloadable from www.brattle.com)

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- **Plexus Research, Inc., "Deciding on Smart Meters," Edison Electric Institute, September 2006** (Downloadable from www.eei.org/ami)

- **Federal Energy Regulatory Commission, "Demand Response and Advanced Metering," Staff Report, August 2007** (Downloadable from www.ferc.gov)

- **US Department of Energy, "Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them," February 2006**
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