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# ENERGY EFFICIENCY BY RATE DESIGN

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# Why bother with energy efficiency?

- ◆ The industry is faced with a Category 5 energy crisis
  - Rising fuel prices
  - Rising capacity costs
  - Shrinking reserve margins
  - Greenhouse gas emissions
- ◆ The cheapest and greenest kilowatt-hour is often the one you never consume

# Utilities have rediscovered the demand-side of the equation

- ◆ Energy efficiency can play a vital role in meeting future customer energy needs
- ◆ It can also help control rising bills (manage rate shock)
- ◆ And it can help keep the lights on

# There is no single solution to energy efficiency

## ◆ 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

- For controlling costs in real-time conditions through price-sensitive thermostats and appliances

## ◆ Rebates and financing

- Accelerating the adoption of smart end-use technologies

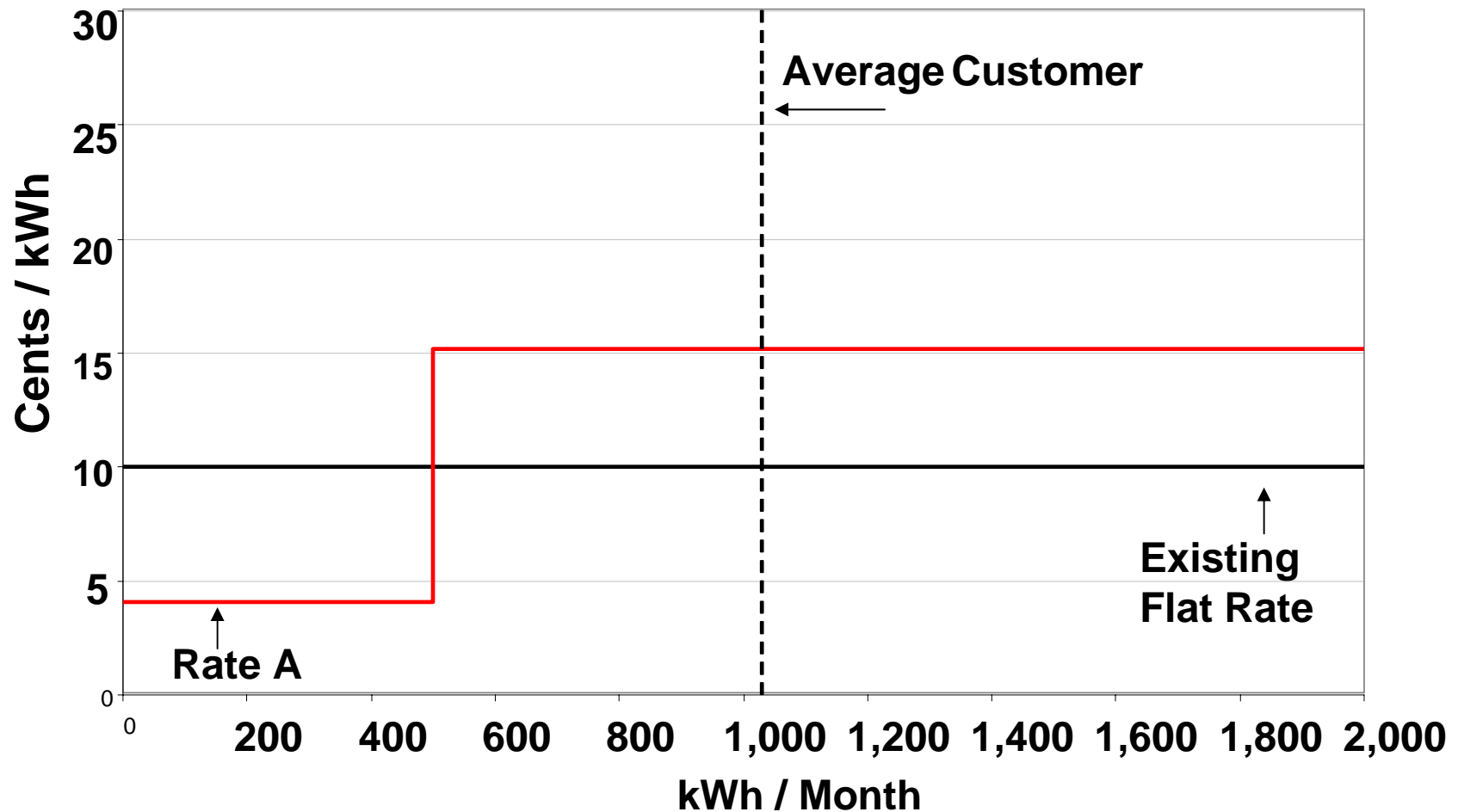
## ◆ Smart rate design

- Inclining block rates for energy efficiency and dynamic pricing rates for peak load management

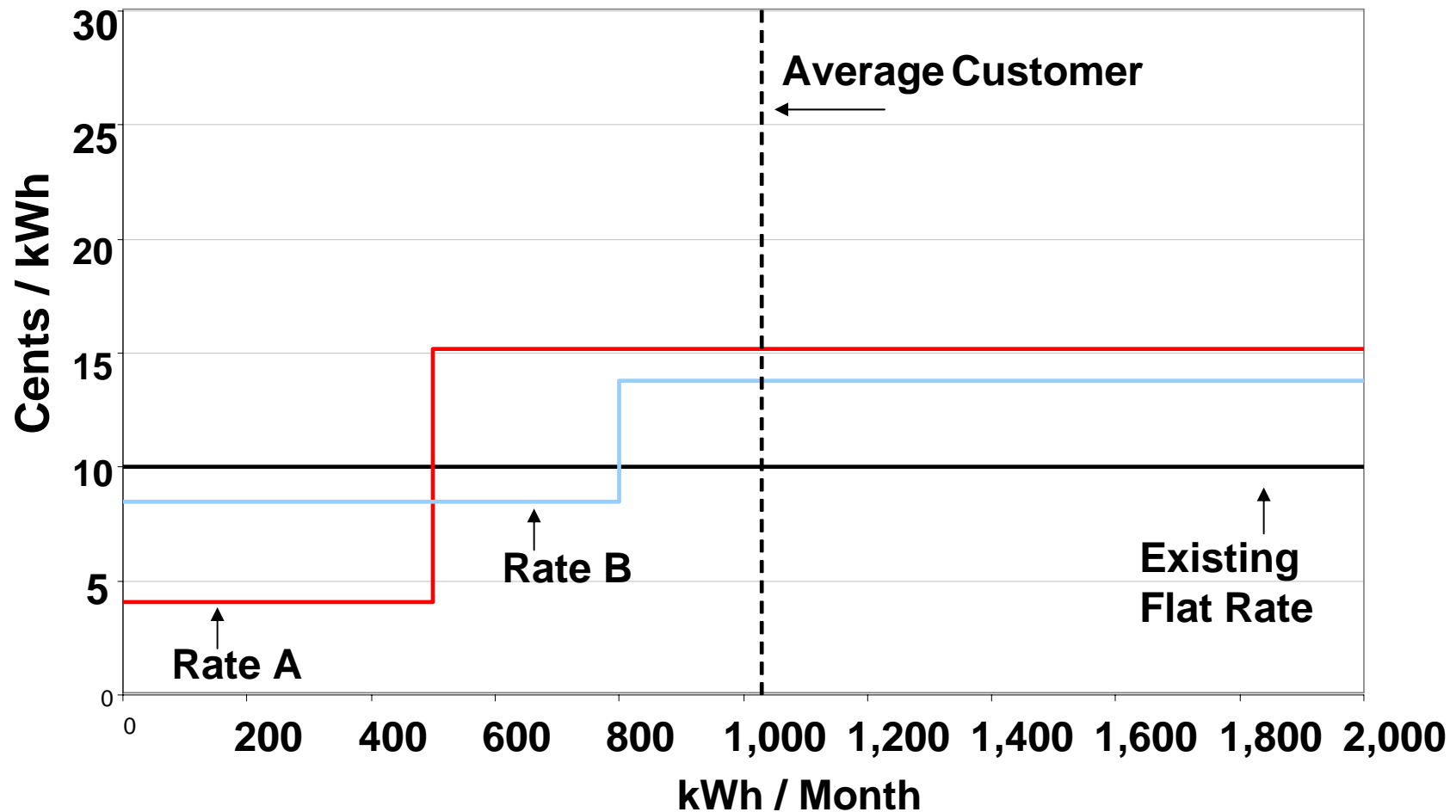
## A well-informed customer is likely to be a smart customer

- ◆ 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 can lower energy use by up to 6 percent
- ◆ But is this a novelty that might wear off?
- ◆ To be sure, we also need to provide the correct price signal to customers

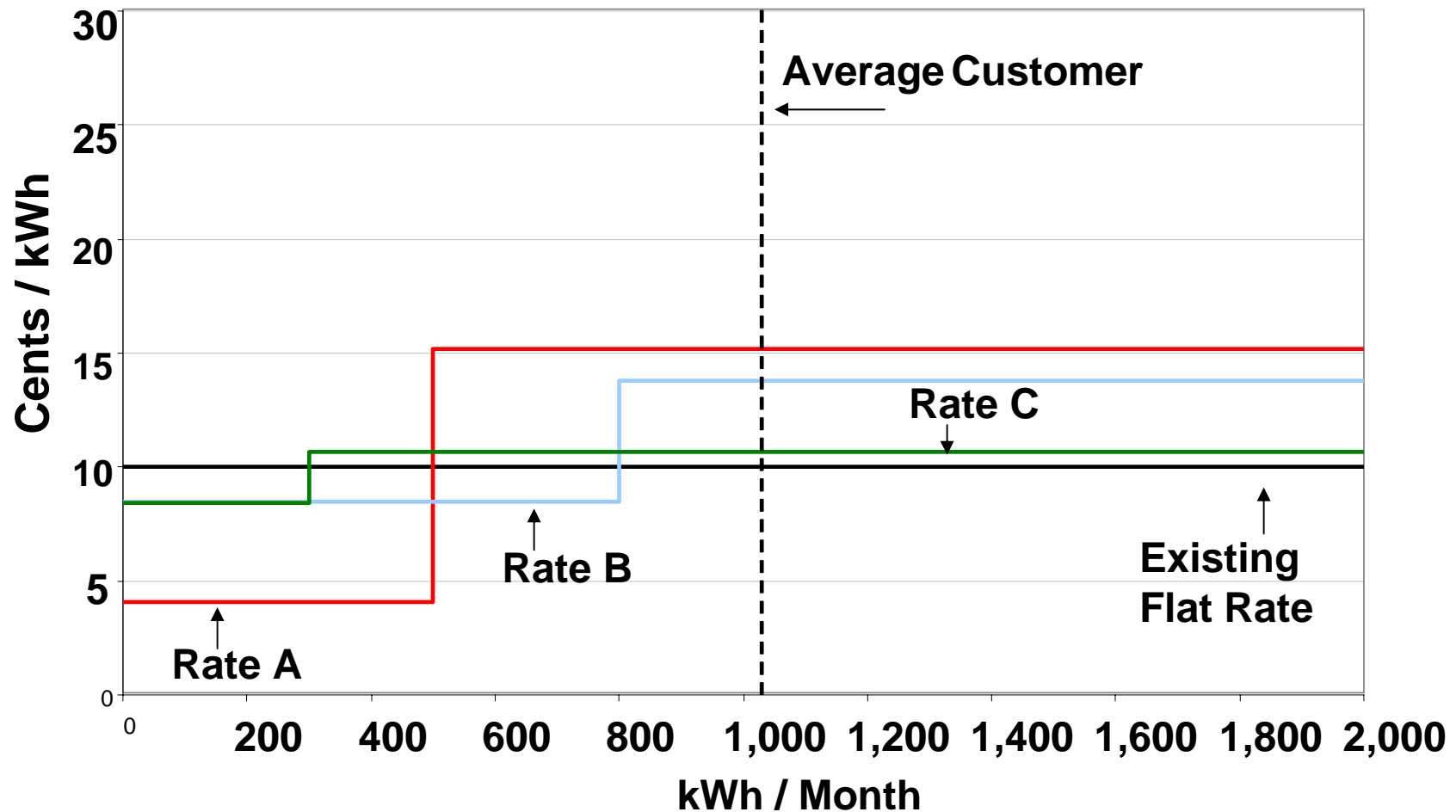
# Introducing inclining block rates



# Rate B has a wider first block than Rate A

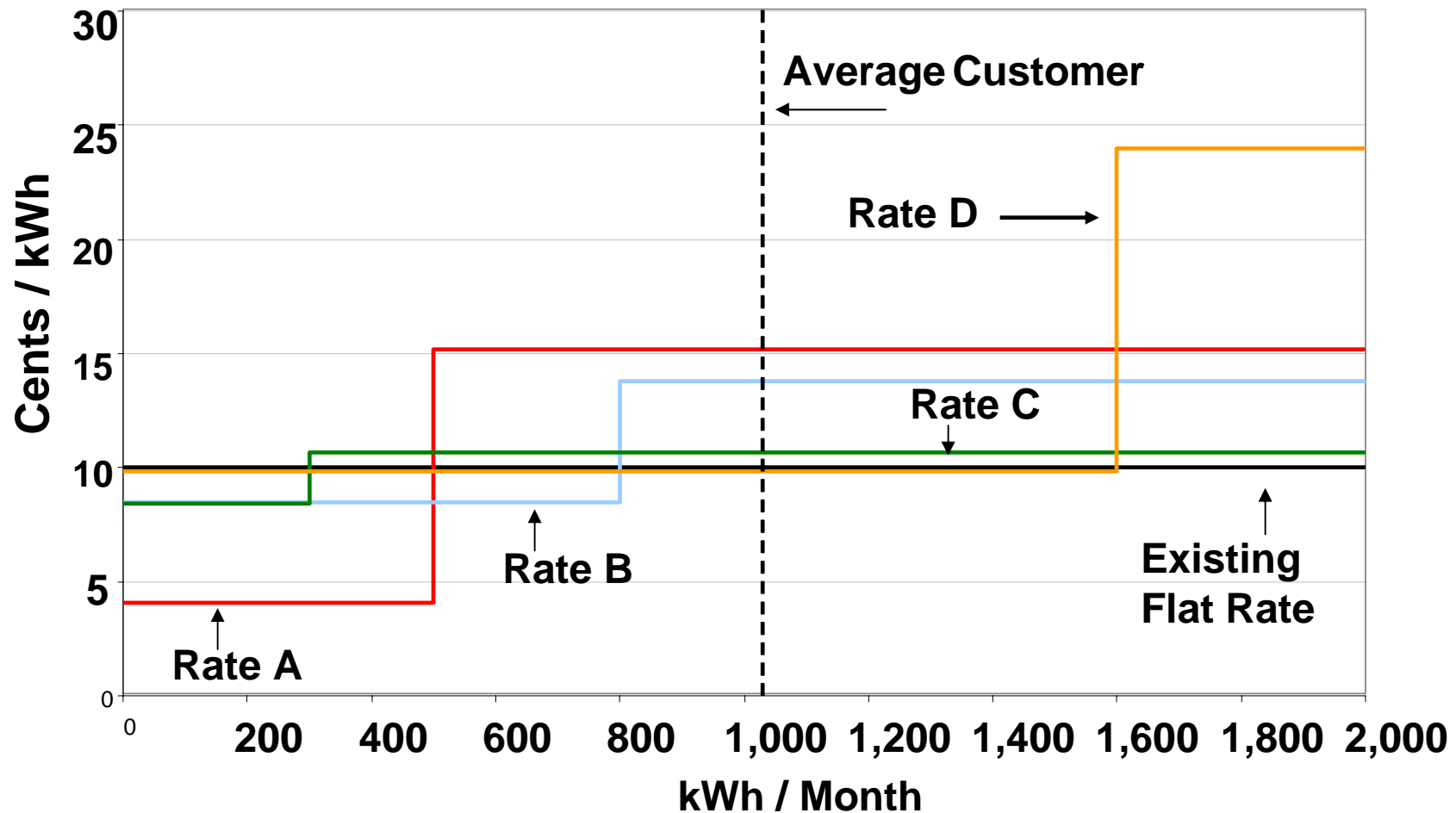


# Rate C is a very mild inclining block rate

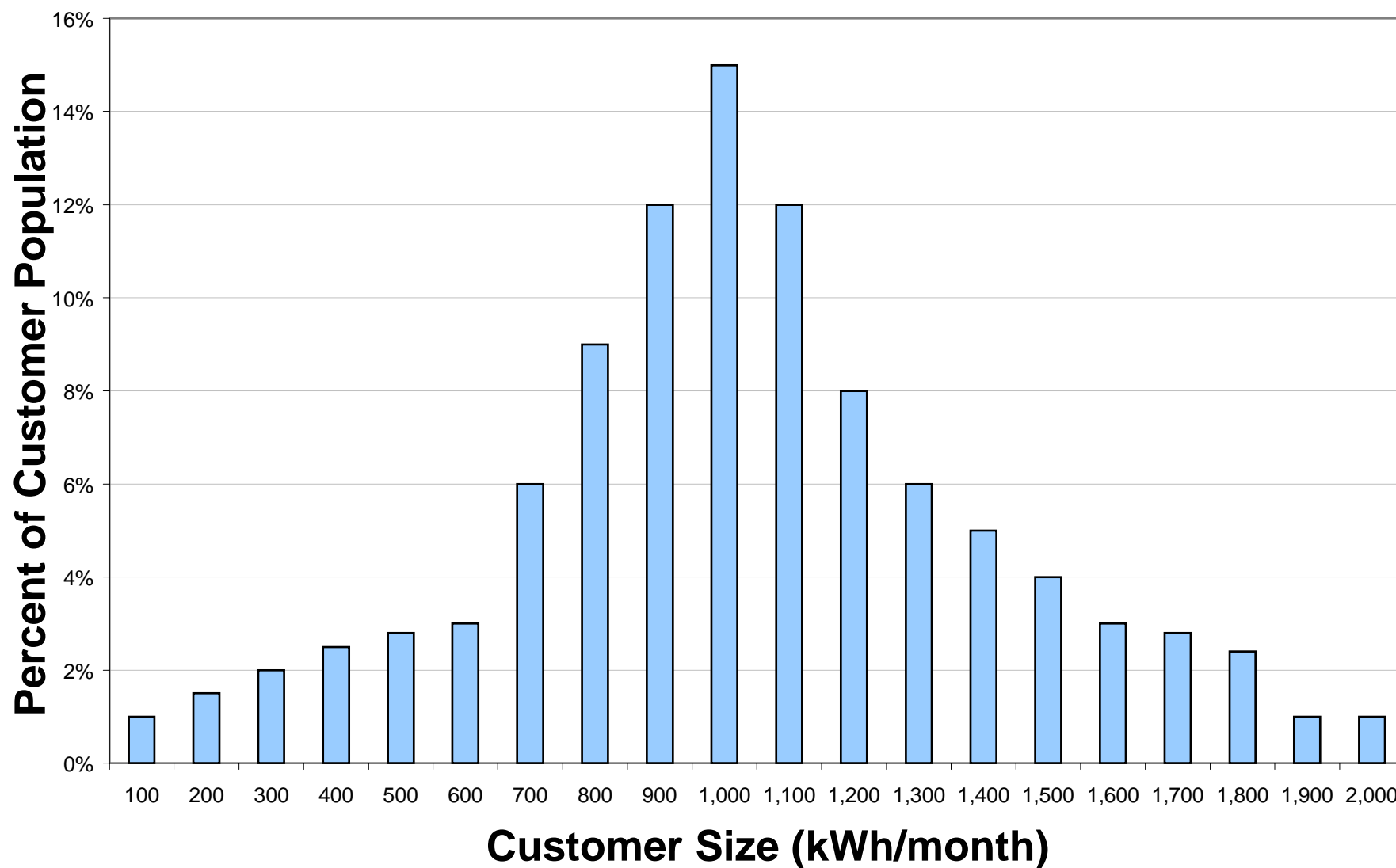




# Rate D focuses on the very largest users



# Representative customer billing distribution



# There is a vast literature on price elasticities

## Price Elasticity Assumptions

		Low	Most Likely	High
Short Run	Tier 1	-0.01	-0.13	-0.20
	Tier 2	-0.02	-0.26	-0.39
Long Run	Tier 1	-0.03	-0.39	-0.60
	Tier 2	-0.06	-0.78	-1.17

- ◆ Elasticities were based on a survey of many studies spanning three decades
- ◆ Long run elasticities are generally greater than short run elasticities
- ◆ Tier 2 elasticities are assumed to be greater than Tier 1 elasticities
- ◆ Impacts were estimated through a Monte Carlo Simulation assuming a triangular distribution of the elasticities

# Energy use could decline by up to 5.9 percent

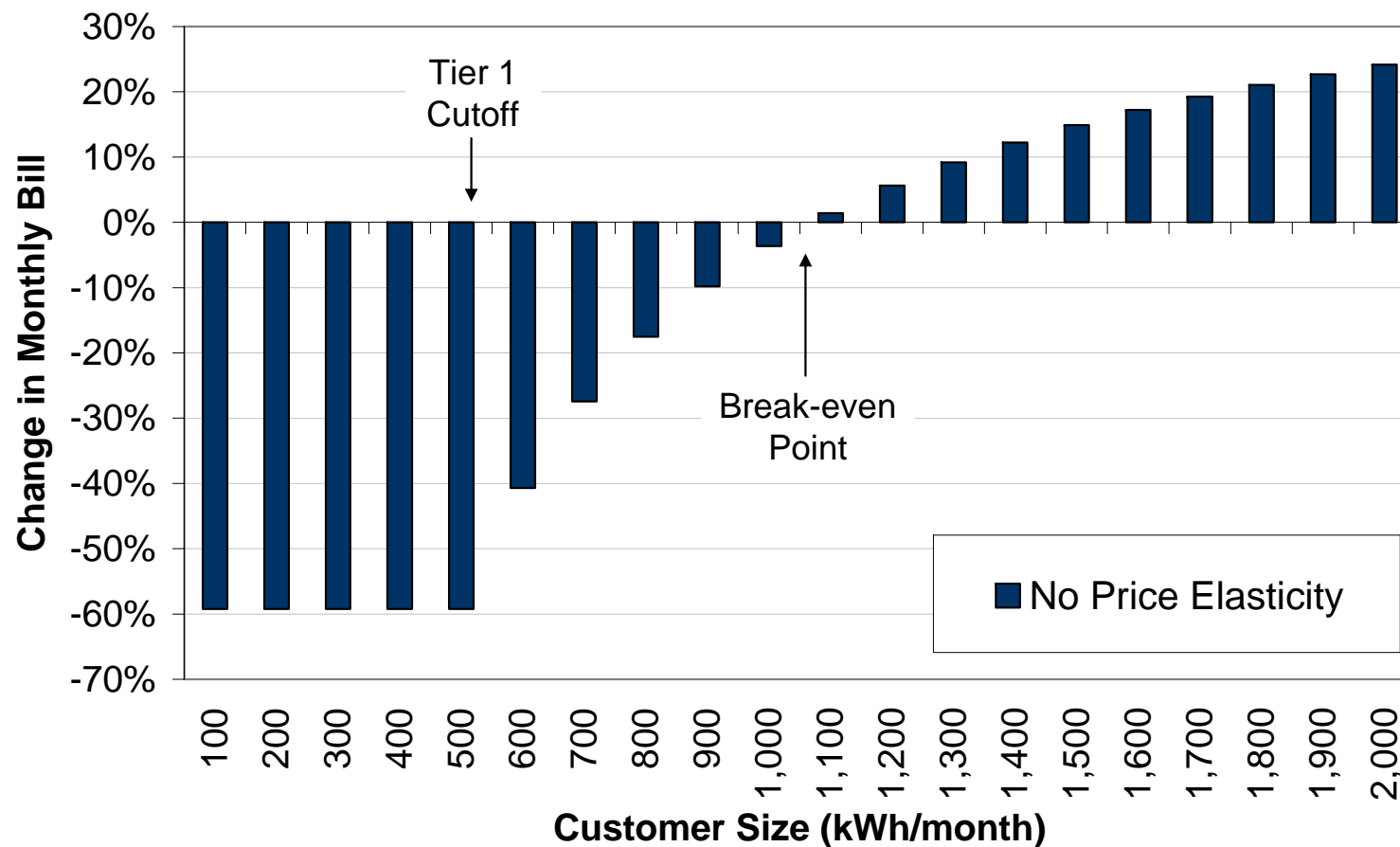
Price Elasticity	Avg Percent Change in Usage				
		Rate A	Rate B	Rate C	Rate D
Short Run	Mean	-5.9%	-2.2%	-1.0%	-0.5%
	Std Dev	2.0%	0.8%	0.3%	0.2%
Long Run	Mean	-18.4%	-6.7%	-3.1%	-0.7%
	Std Dev	6.5%	2.4%	1.1%	0.4%

## Customer bills could decline by up to 9.1 percent

Price Elasticity	Avg Percent Change in Customer Bills			
	Rate A	Rate B	Rate C	Rate D
Short Run	-9.1%	-3.1%	-1.0%	-1.4%
	3.1%	1.1%	0.4%	0.5%
Long Run	-28.4%	-9.4%	-3.3%	-2.6%
	9.9%	3.4%	1.1%	1.0%

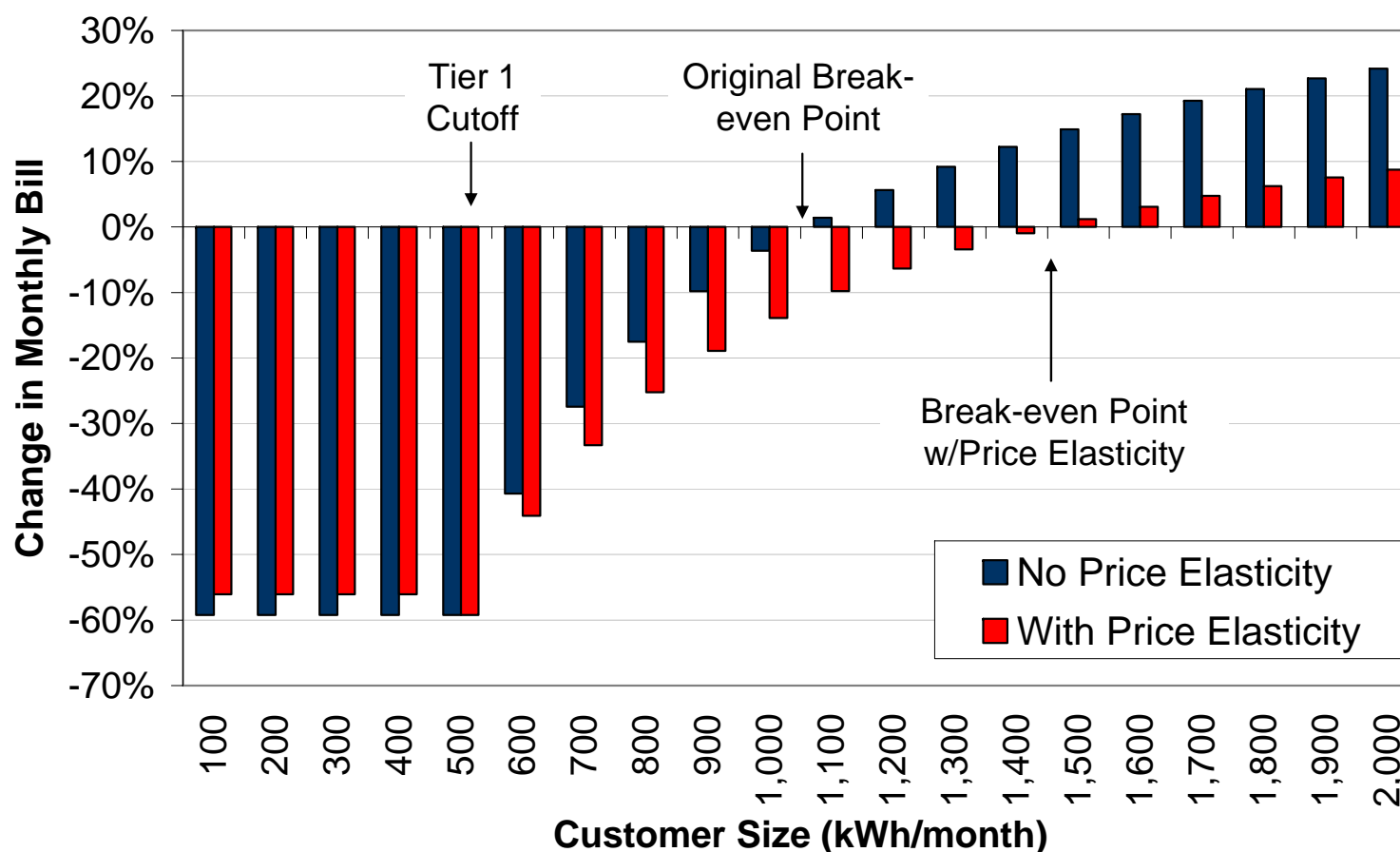
# Bill savings are largest for the smallest customers

Simulated Distribution of Bill Impacts



# Price response mitigates the impact on high use customers

Simulated Distribution of Bill Impacts



# Frequently Asked Questions

- ◆ How many blocks should I include in the rate design?
  - Start with two blocks and see if that does the job
- ◆ How wide should be the blocks?
  - Depends on how much consumption you want to protect
- ◆ How steep should be the steps between the blocks?
  - Depends on the slope of your marginal cost curve and how much energy efficiency you want to induce
- ◆ Will my customers respond?
  - Yes, they will based on scores of studies that have been carried out over the past three decades
  - But to get the most response, you have to make them aware of the new rate design, educate them on how to respond to it and do not leave it to chance



## FAQs (continued)

- ◆ What will be the likely impact on energy consumption?
  - At least one percent and maybe as much as six percent
- ◆ Will I be faced with revenue erosion?
  - You should be able to deal with it the same way you deal with the impact of your DSM programs on revenue
- ◆ Do these rates require smart meters?
  - No, but if you are already moving to smart meters, because of their operational benefits and their demand response benefits, you may be able to provide more information to customers about where their energy dollar is going and how they can get the most value out of it
- ◆ Will I have to change the billing system?
  - No, but you will have to change the way it produces customer bills

## FAQs (concluded)

- ◆ Does this approach work for utilities that have declining block rates today?
  - Yes, they should first consider moving to flat rates
- ◆ Should distribution-only utilities consider these rate designs?
  - Yes, since the bulk of the customer's bill is for the energy charges
- ◆ What should I do if don't trust your price elasticity estimates?
  - Consider doing your own pilot program where you place some customers on inclining block rates and some on flat rates and observe the difference.
- ◆ Does a large DSM budget make these rates redundant?
  - In the near term, the two are complementary since these rates make DSM more attractive by shortening the payback period.

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