The Emergence of the Energy Services Utility

North Carolina Electric Membership Corporation

Ahmad Faruqui

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The presentation covers five topics

1. Slow growth in electricity sales
2. Utility options in a slow growth environment
3. Historical precedent for the energy services utilities
4. Characteristics of an energy services utility
5. The smart grid can enable the provision of new energy services

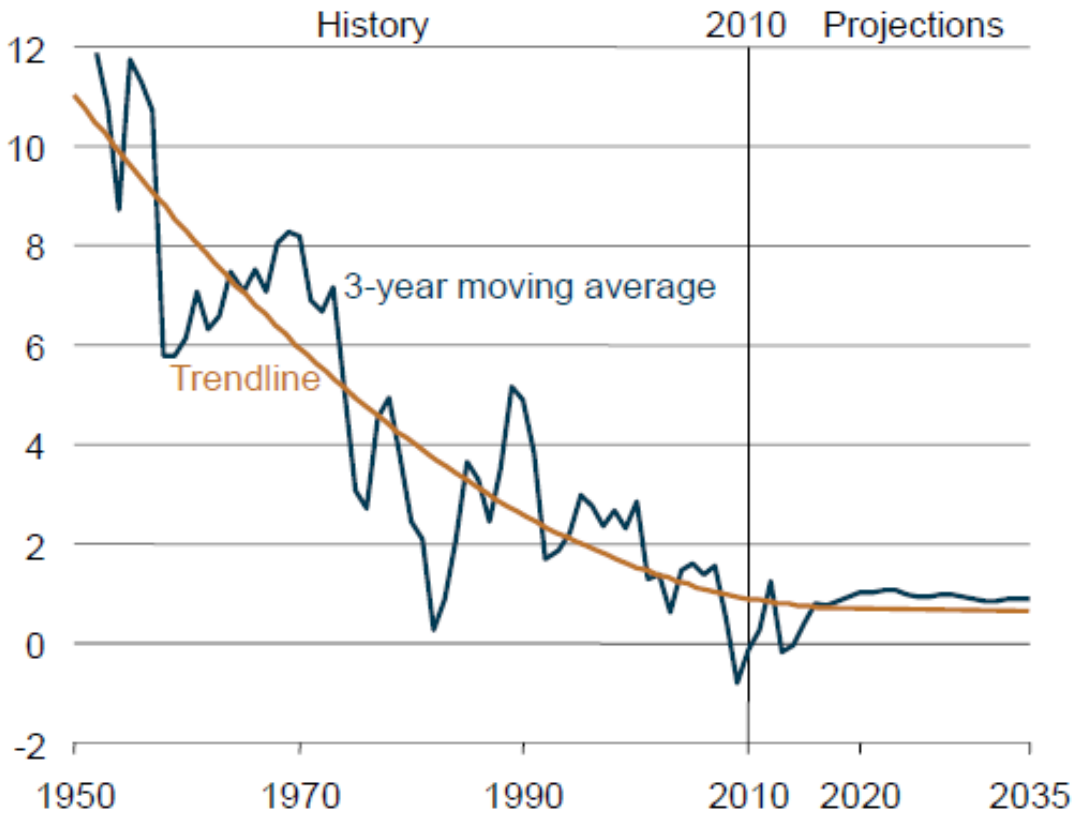
Normal electricity growth has not resumed four years after the Great Recession ended

- According to Dr. John Caldwell of the Edison Electric Institute, normal growth usually resumes within five months after the recession ends; the longest it has ever taken has been twelve months

- The EIA's May 2014 Short-Term Energy Outlook (STEO) projects that electric retail sales will grow by 2.3% in 2014 and 0.0% in 2015; in the residential sector, the corresponding growth rates will be 3.1% and -1.5%

Of course, declining growth has been the norm and not the exception since 1950

U.S. Electricity Demand Growth, 1950-2035 (percent, 3-year moving average)



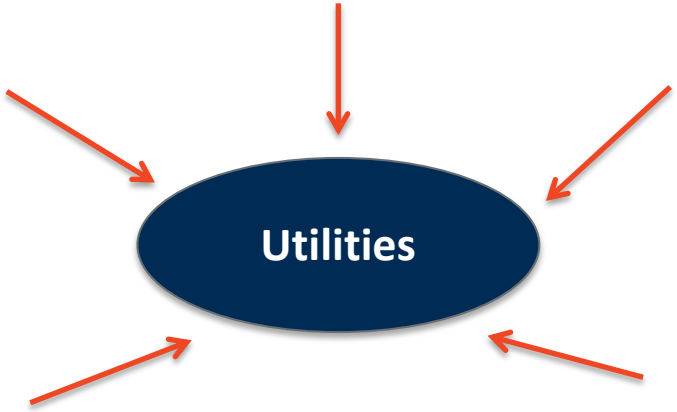
Source: EIA, 2012 Annual Energy Outlook

Five new forces have shaped the recent drop in growth

1. Consumer psychology has shifted as a new generation of consumers has arrived with new values and new technologies

2. Utilities are stepping up their spending on energy efficiency programs

3. State and federal governments are continuing to push ahead with aggressive enhancements to codes and standards

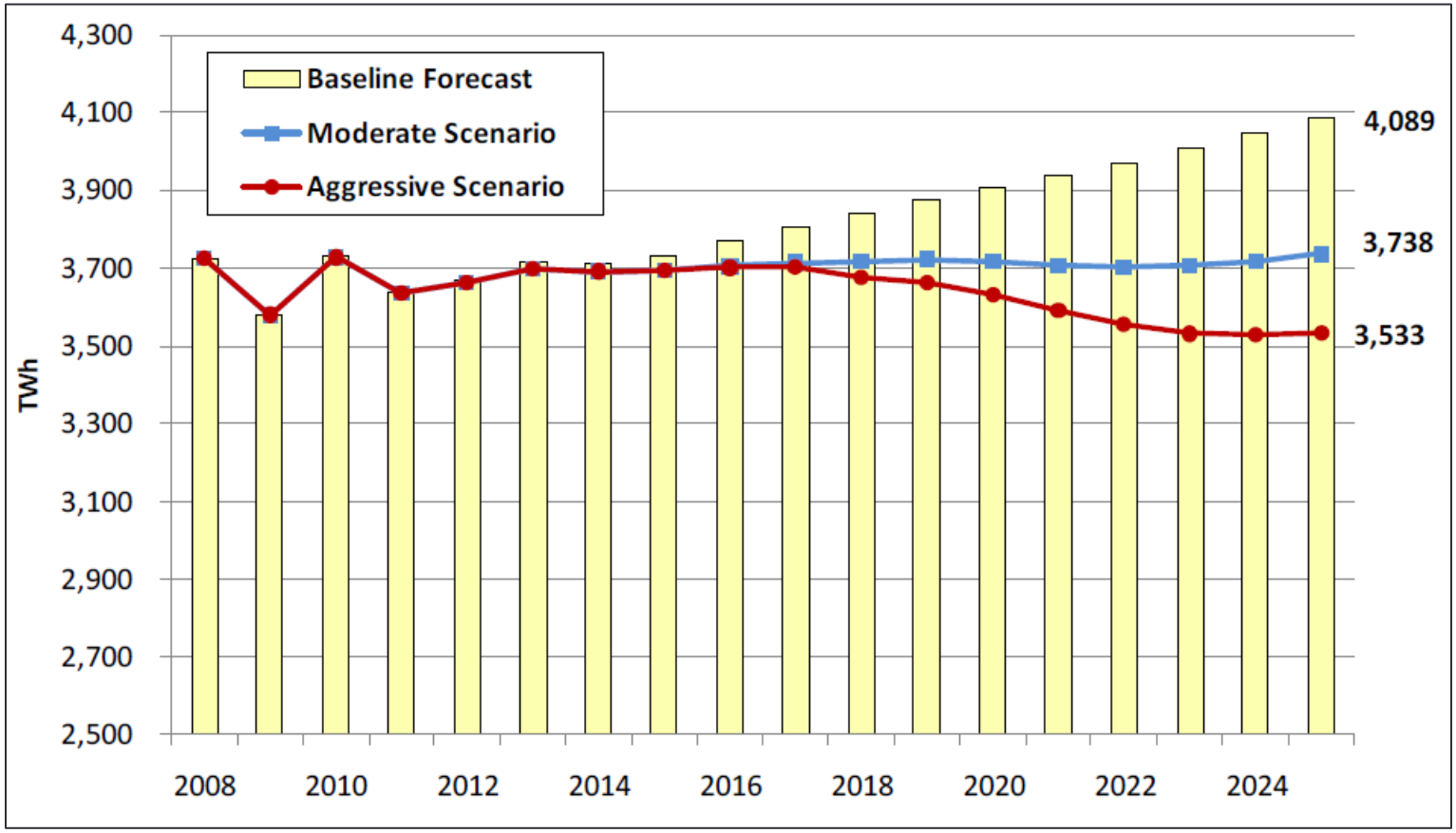


4. Distributed generation is led by the revolution in roof-top solar and supplemented by micro turbines. Net metering enables distributed generation to expand

5. Fuel switching is also contributing to low sales growth. The revolution in shale oil and gas is pushing fuel prices downwards

New codes and standards could dramatically decrease baseline energy consumption

Impact of Codes and Standards on Total U.S. Electricity Consumption (TWh)



Source: IEE, Assessment of Electricity Savings Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes (2010-2025)

What are the options for electric utilities?

To deal with the five forces, utilities can pursue one of four strategies

1. Stay the course
2. Push electrification
3. Become a wires company
4. Become an energy service utility

First strategy – stay the course

The assumption is that growth will resume by itself; declining energy prices will herald an industrial revival and boost electricity sales

CERA's Larry Makovitch has put forward a provocative argument along these lines

- **http://www.powermag.com/issues/features/Expect-U-S-Electricity-Consumption-to-Increase_5634.html**

This is a very high risk strategy, as noted on the next slide

Second strategy – electrification

Push on plug-in electric vehicles and other plug loads

- http://www.economist.com/news/leaders/21578679-electric-car-stalls-race-be-green-wheels-future-not

Conduct research, development and demonstration of new industrial processes that are electricity-intensive

The results of this strategy will only payoff in the long run; they will provide very limited benefits in the near-term

- Efforts to boost electricity sales in the 1980s and 1990s have borne little fruit

Third strategy – the safe haven

Utilities can become a wires company, but many utilities are already wires companies

All wires companies face the risk of collecting insufficient revenue since the bulk of distribution charges are tied to sales and as sales growth slows down, they will not be able to cover their fixed costs

Fourth strategy- become an energy services utility

In contrast to a traditional energy utility, which sells electricity to customers, an energy services utility sells customers end use services such as lighting, heating and cooling

Of course, the energy services utility still has the task of delivering electricity like a traditional wires company, but the business proposition is fundamentally different

There is historical precedent for the energy services utility

In 1881, Thomas Edison designed the first contract system for energy service, charging customers a fixed amount per lamp. This pricing system reflected his vision for the electric industry as he competed against the gas-lit lamps of the day

A century later, Roger Sant published "Coming Markets for Energy Services" in the *Harvard Business Review (1980).* Sant proposed that utilities could sell energy services to compete with end-use equipment manufacturers, such as General Electric

The term, energy services utility, was probably coined by Peter Fox-Penner in his 2010 book, *Smart Power,* Island Press

Energy service companies (ESCOs) first emerged in France

Since the 19th century, energy service contracts have existed in France where the idea of the ESCO was born

- The largest ESCOs in France operate as subsidiaries of the main utility companies, offering heating service in the form of chauffage contracts. Chauffage contracts are long-term agreements that guarantee a certain performance level that is specific to metrics, such as temperature and humidity levels

ESCOs differ from energy service utilities in that they do not necessarily have utility affiliation. ESCOs design their contracts to provide customers with energy efficiency services, and the ESCO receives a share of the energy savings

ESCOs success in the United States

The National Association of Energy Service Companies (NAESCO) now lists over 40 members including Honeywell, Siemens Industry, and Lockheed Martin

NAESCO reports that ESCOs have achieved $50 billion in verified energy savings since the 1990s

Some utilities sell energy services but are regulated on the sale of electricity

Utilities in many states such as California, Illinois and Maryland offer energy services to their customers under the umbrella of demand-side management programs – these programs are designed to bring the benefits of energy efficiency and demand response to the power system while allowing customers to lower their energy bills

In April 2014, the New York Department of Public Service released a new state energy plan that proposes to transform the state's into platforms for selling energy services

The business proposition

Such a utility is incentivized to maximize customers' energy efficiency and makes money on how much efficiency it sells.

Where wholesale markets exist, it can bid demand and energy savings from its customers into those markets

- It may sell a customer a fixed-price contract to light a 500 square foot workspace with 70 lumens/square foot. By lighting the area more efficiently, the utility can realize the value of the reduced peak demand and reduced electricity sales
- The utility can diversify its offerings by charging different rates for different levels of service at different times or allowing for service curtailment on short notice
- The utility can also take advantage of new technology trends and offer new energy services, such as electric vehicle charging

Services that can be offered by energy service utilities include:

- Lighting
- Space Heating
- Space Cooling
- Water heating
- Water pumping
- Industrial machine drive
- Electric vehicle charging

The energy services utility will need a new skillset

Unlike a traditional utility, the energy services utility will not meet new demand by building more power plants

Instead, it will need to understand its customers' need for end use energy services and their demand profiles and also understand the current and future offerings of competitors

It will need to invest in acquiring new operational and business skills in order to price and deliver its energy services

Tailoring energy service products to individuals with customer-level data is one area where the deployment of the smart grid, notably that of advanced metering infrastructure (AMI) can help

AMI will facilitate the transition from traditional utility to energy service utility

The AMI-enabled company will be able to provide a wide range of existing and new services effectively

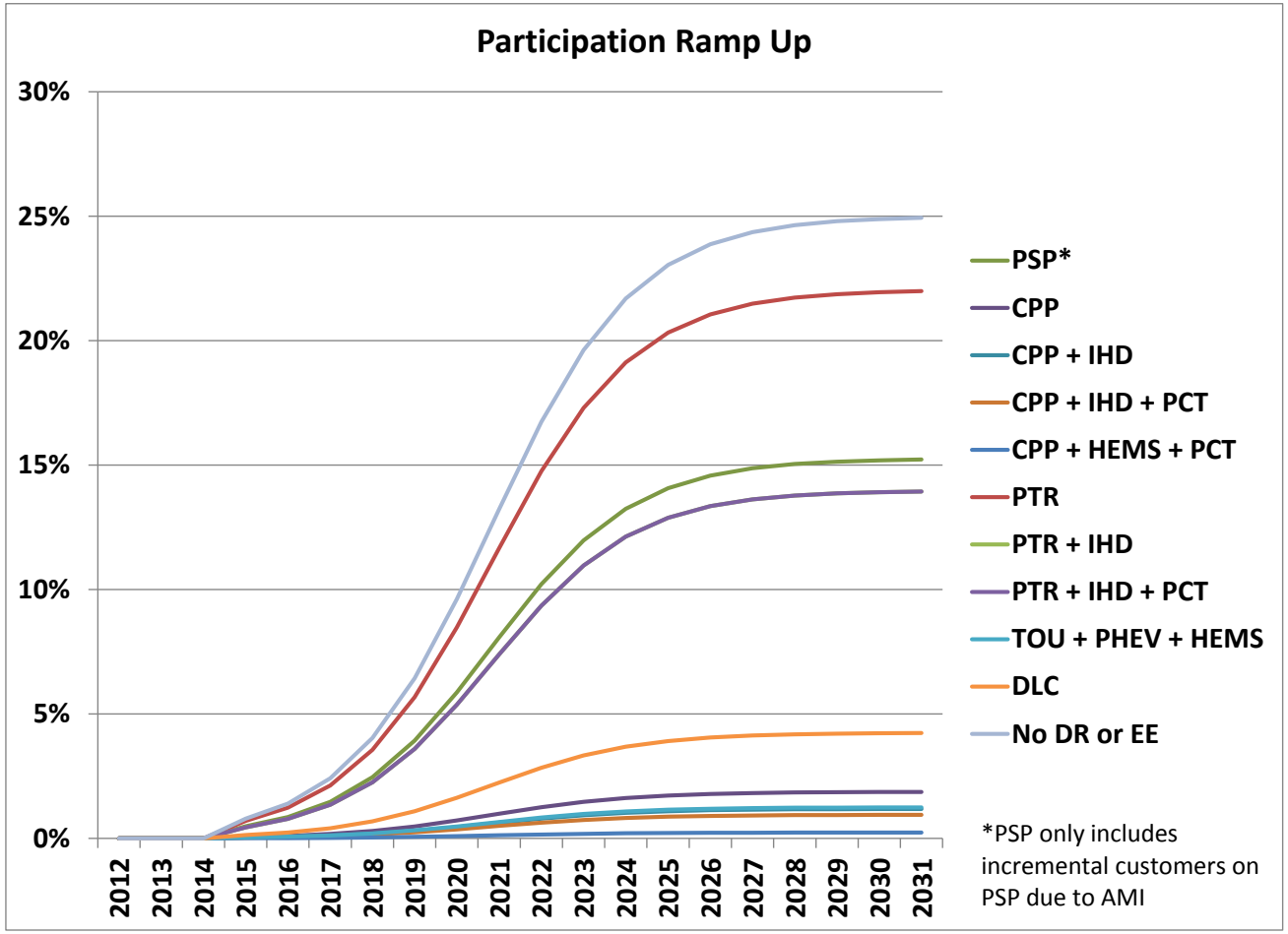
- Energy efficiency
- Demand response
- Electric vehicle charging

To quantify the possibilities opened up the deployment of AMI, we present the results of a case study of a medium sized utility operating in the Midwest

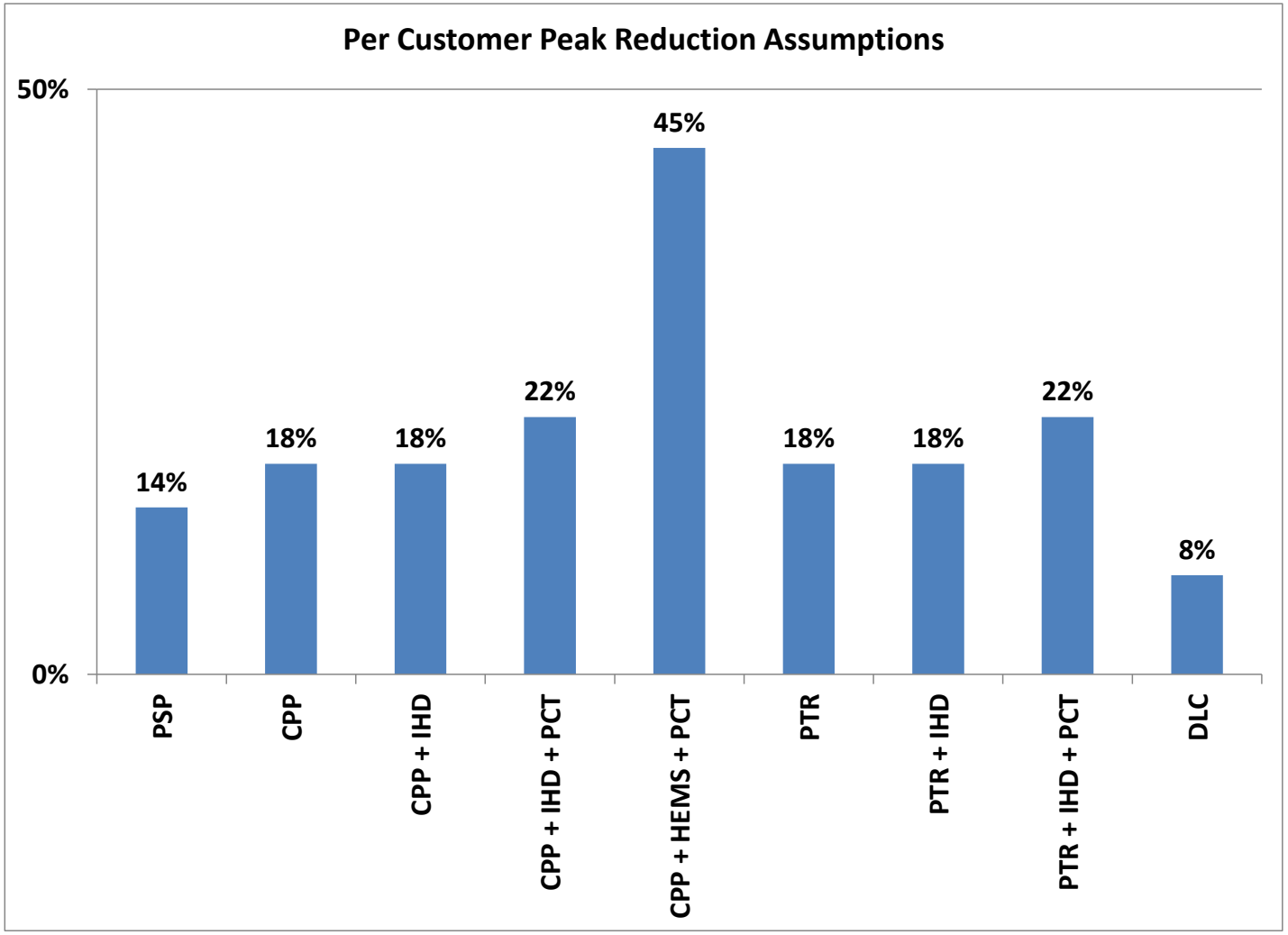
Ten programs could be offered by the AMI-enabled energy services utility

PTR	• Peak Time Rebate (PTR)
PTR + IHD	• PTR with In Home Display (IHD)
PTR + IHD + PCT	• PTR with IHD and Programmable Communicating Thermostat (PCT)
PSP	• Power Saving Pricing (A form of real time pricing)
DLC	• Direct Load Control
TOU + PHEV + HEMS	• Time of Use (TOU) rate with Home Energy Management System (HEMS) for electric vehicles
CPP	• Critical Peak Pricing (CPP)
CPP + IHD	• CPP with IHD
CPP + IHD + PCT	• CPP with IHD with PCT
CPP + HEMS + PCT	• CPP with HEMS and PCT

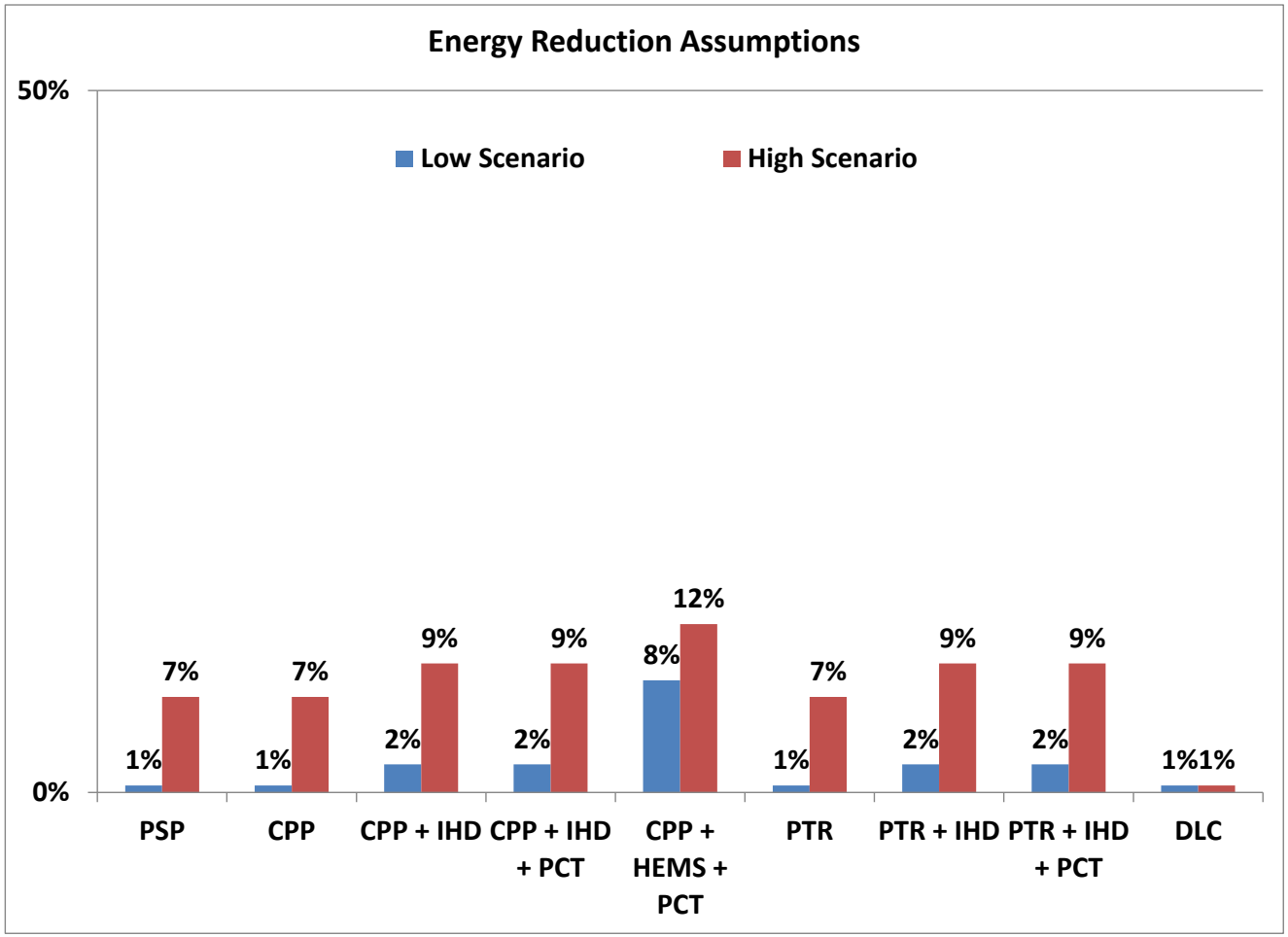
In the study, we assumed that participation ramp-up follows an S-shaped curve



We base the per customer peak reductions on Brattle's *Arc of Price Responsiveness* as well as the utility's own analysis



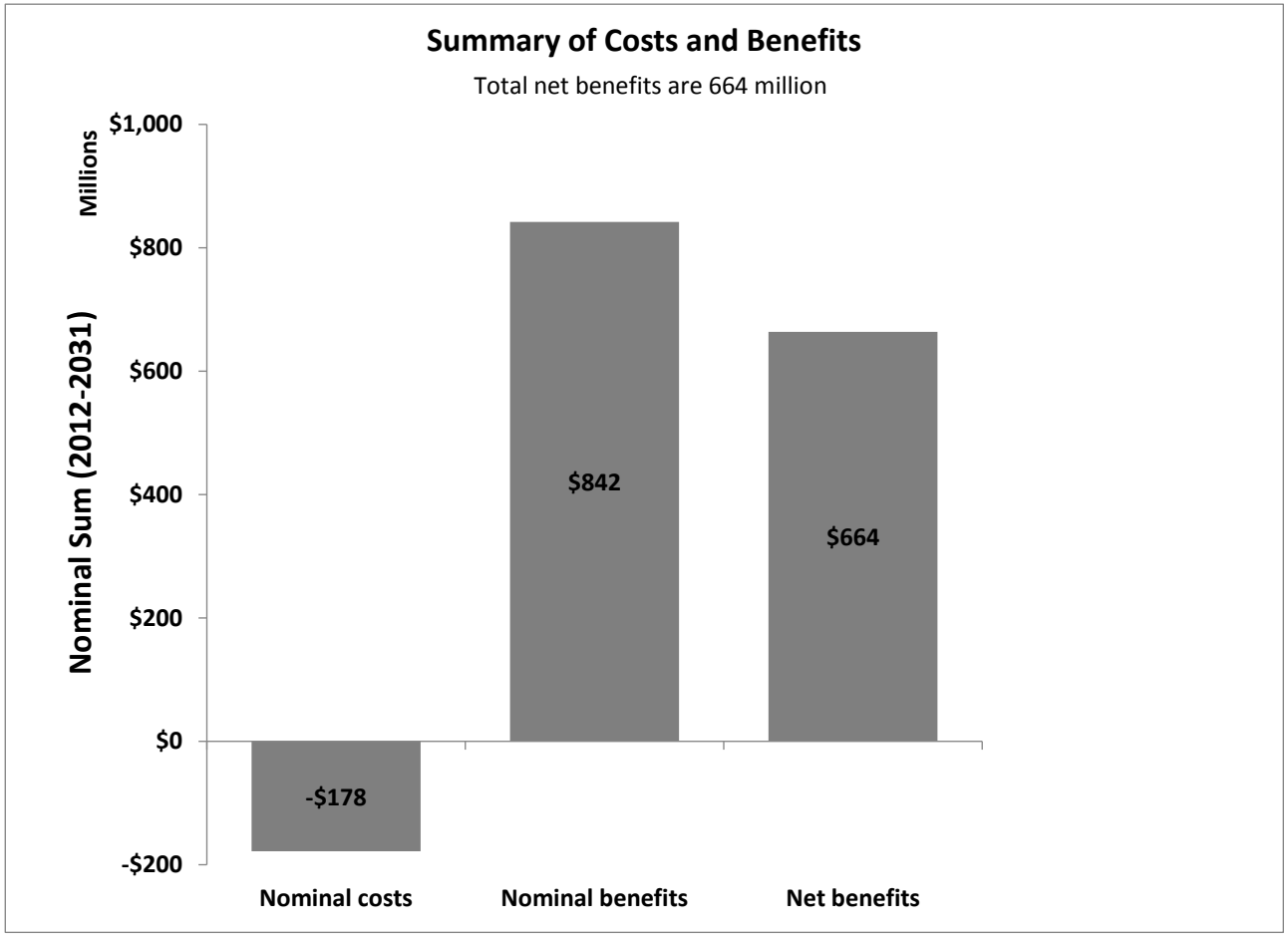
Energy reductions vary widely across studies, and we use a range for each option



We also make the following assumptions

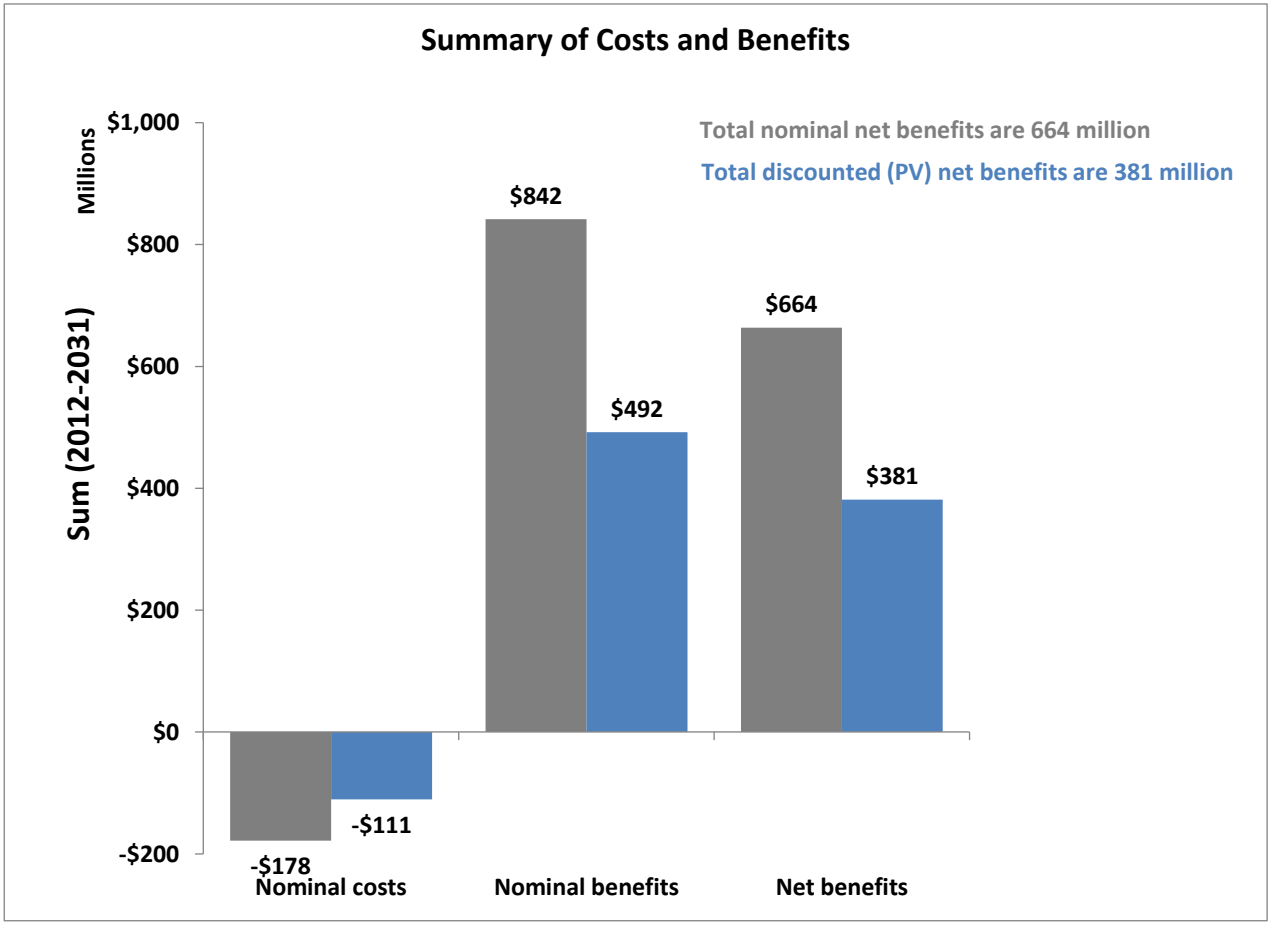
1. **Per customer impacts for non-residential customers**
   - We use assumptions derived empirically for the 2009 FERC report
   - 7% for price only and 14% for price plus technology
   - Applies to medium, large, and very large customers (in the FERC report, applies to customers greater than 200 kW)
2. **Costs per unit for non-residential customers**
   - ADR assumed to cost between $2,000 (low) and $3,000 (high) in this iteration

The nominal (undiscounted) net benefits are $664 million

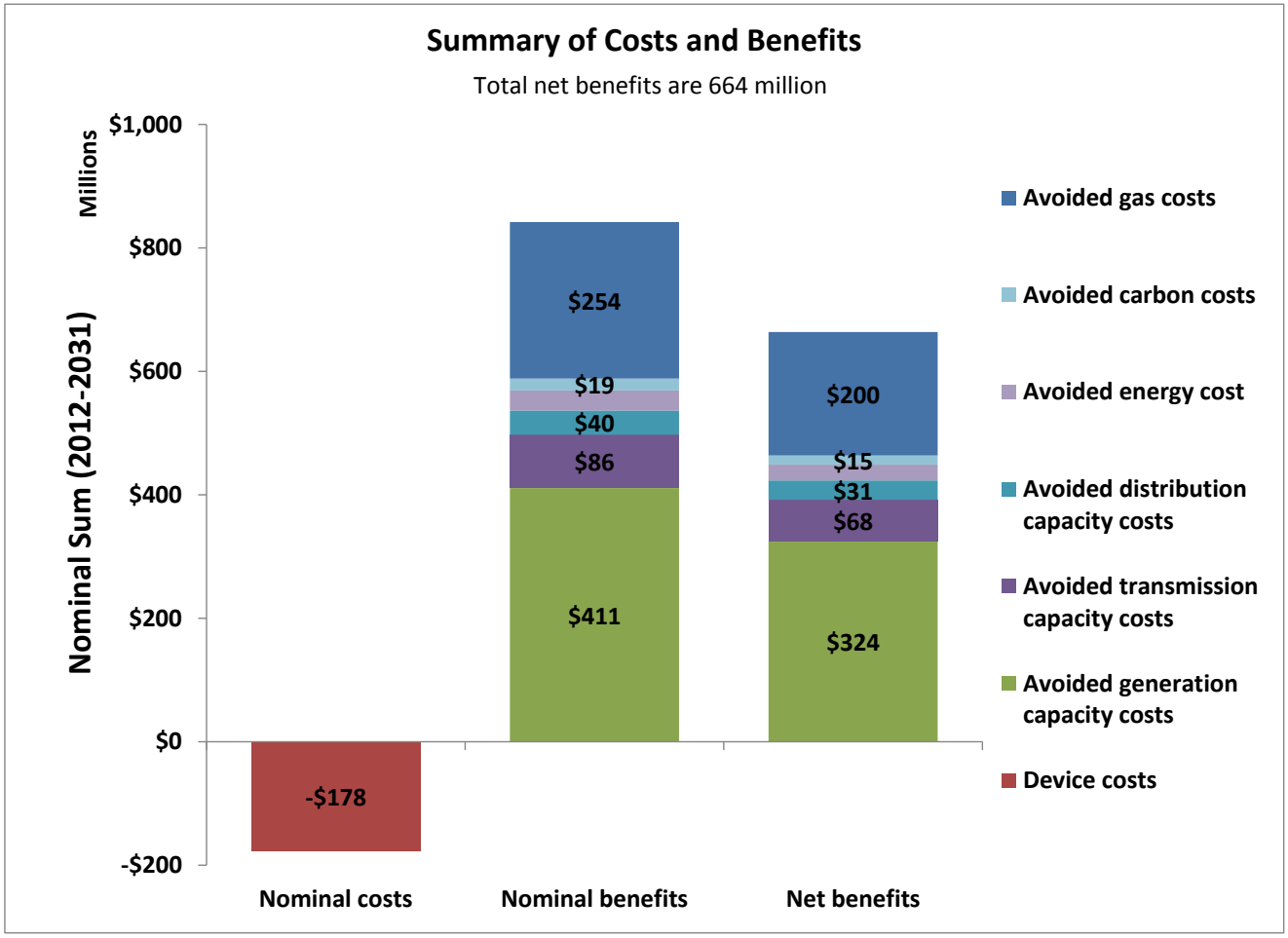


In present value, the net benefits are $381 million

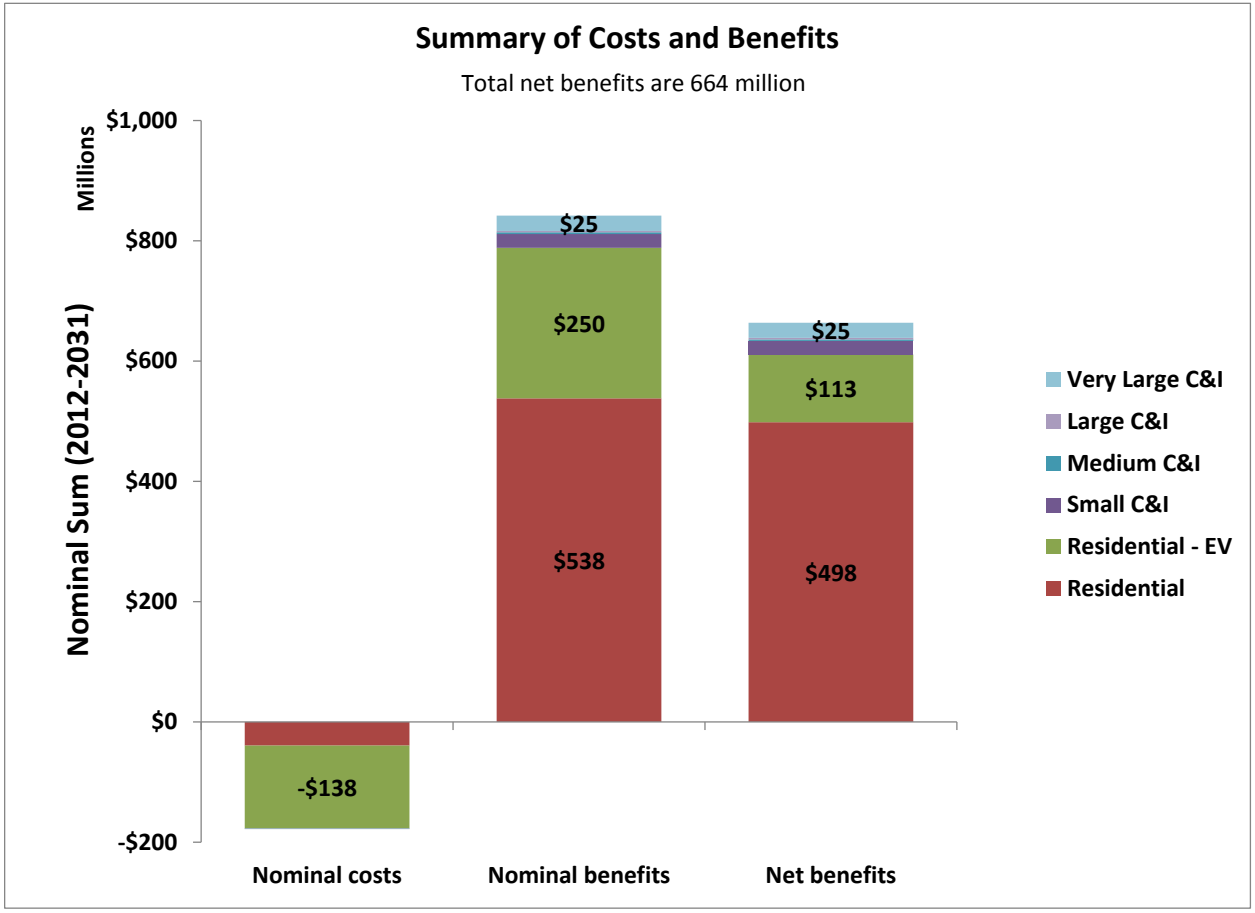
*For the remainder of this section, results are shown in nominal terms



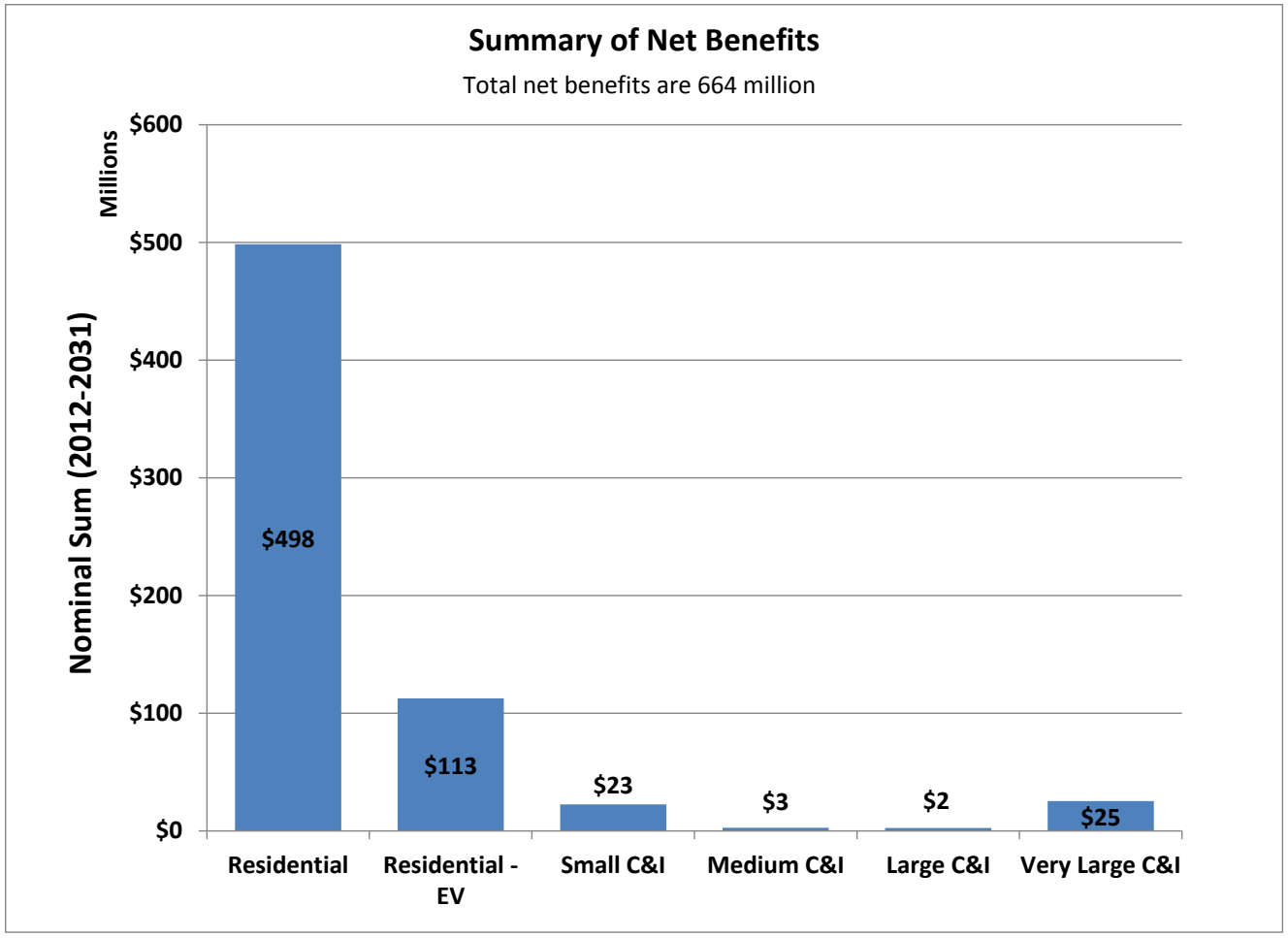
Avoided costs are dominated by avoided generation capacity costs and gasoline costs



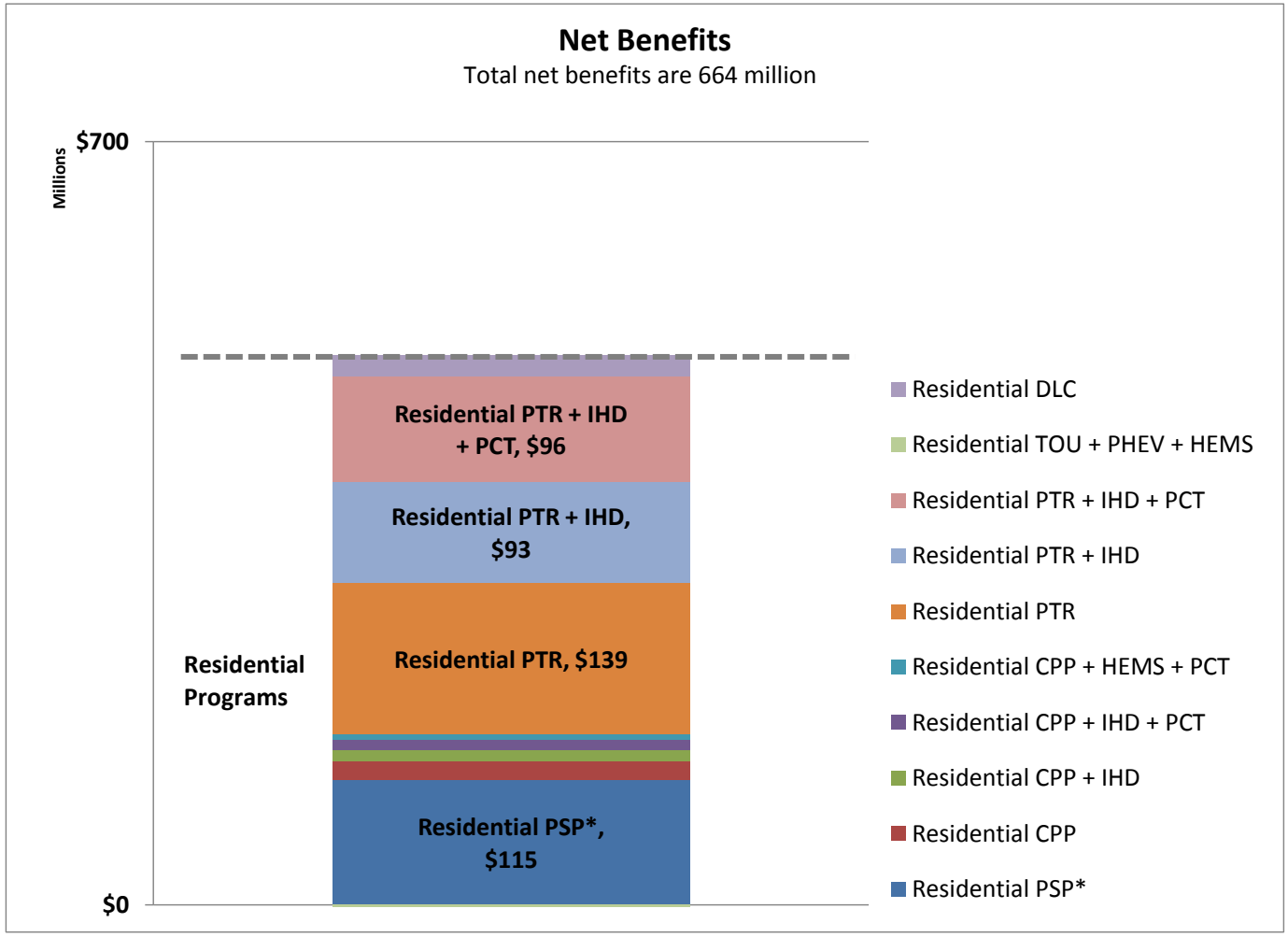
Most benefits come from residential DR and EE programs and electric vehicles (EVs)



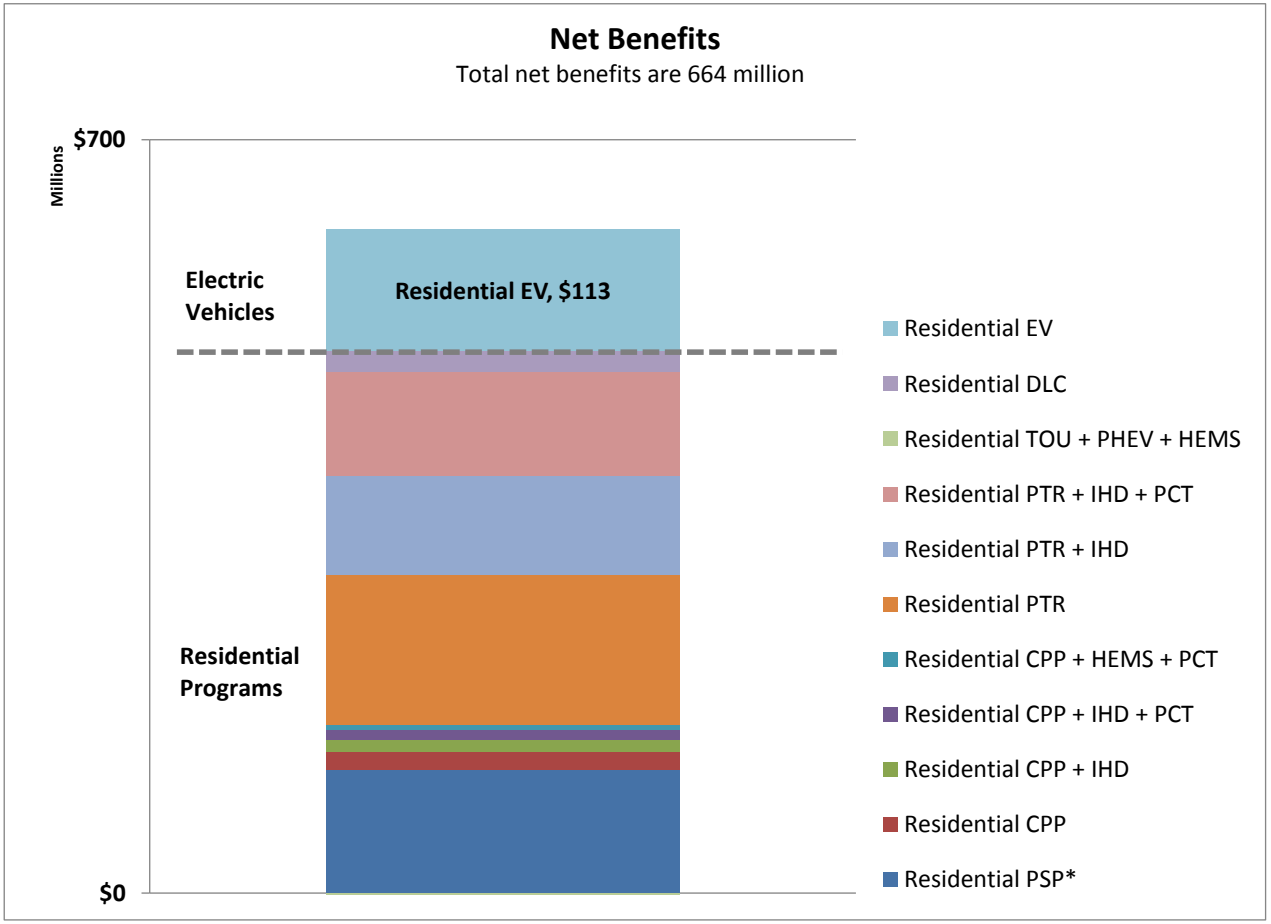
Almost $500 million of the net benefits come from residential DR and EE programs



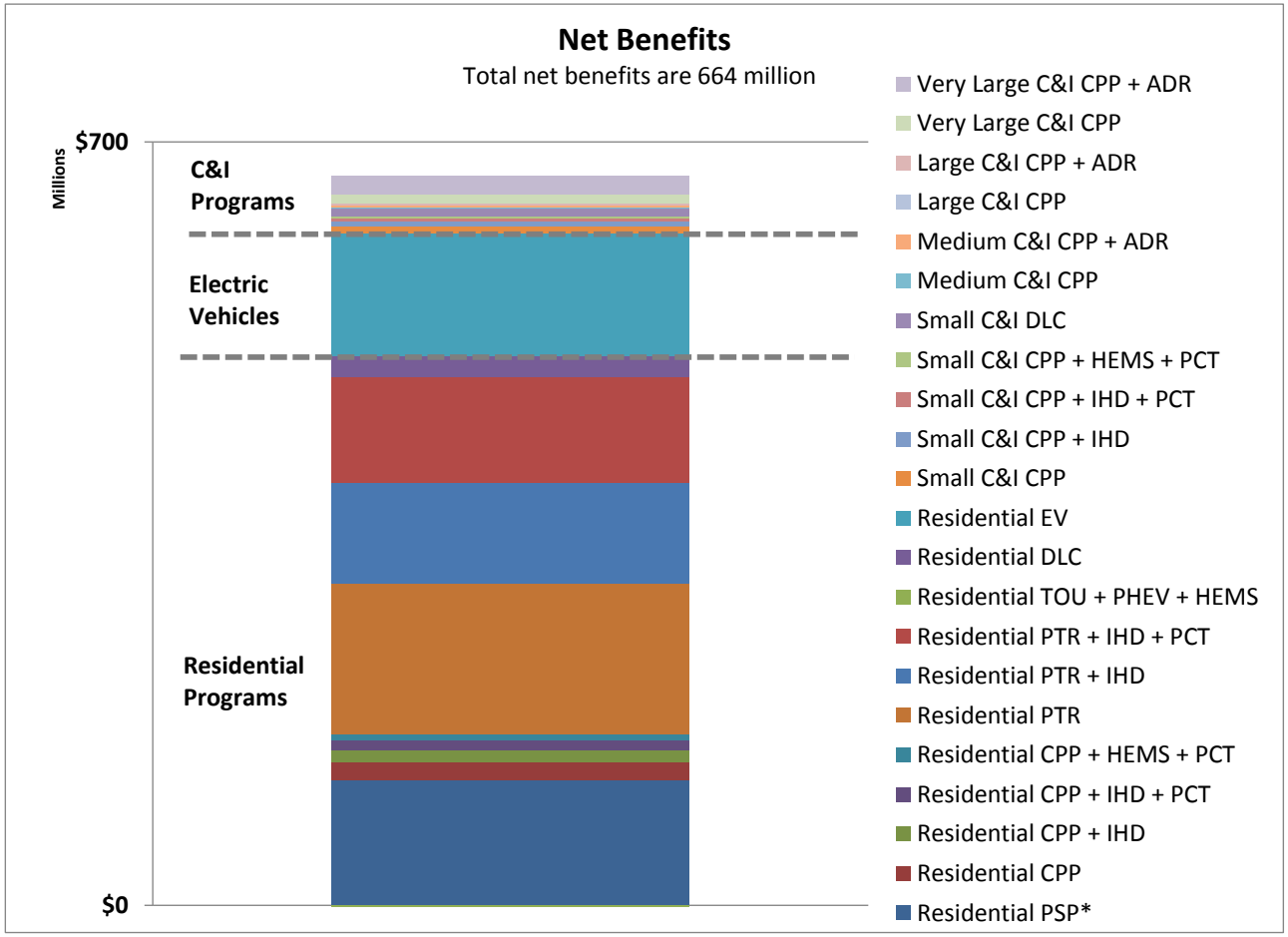
Of the $500 million in net benefits, most come from PTR and power saving pricing



Electric vehicles add another $113 million in net benefits



The non-residential DR and EE programs bring total net benefits up to $664



Conclusion

Evolving into an energy services provider from being an electricity provider is a promising strategy for utilities that want to get out of the death spiral that might ensue if low sales-growth persists into the indefinite future

As they transition from selling electricity to selling energy services, utilities will need to be innovative in the contracts and services they offer to meet customer needs because the energy services market is going to be very competitive

Utilities that deploy the smart grid will be well positioned to offer energy services

Presenter Information

AHMAD FARUQUI, PH.D.
Principal | San Francisco
Ahmad.Faruqui@brattle.com
+1.415.217.1026
+1.925.408.0149 (cell)

Dr. Ahmad Faruqui is a Principal with The Brattle Group whose work is focused on the full spectrum of customer-side issues involving demand forecasting, rate design, energy efficiency, demand response, and the smart grid broadly speaking. He has worked for more than three dozen utilities around the globe and testified before a dozen state and provincial commissions and legislative bodies. His work has been cited in *The Economist*, *The New York Times*, the *Washington Post* and *USA Today.* He has appeared on Fox Business News and National Public Radio. The author, co-author or editor of four books and more than 150 articles, he holds a Ph.D. in economics from The University of California at Davis and B.A. and M.A. degrees in economics from The University of Karachi, Pakistan.

The views expressed in this presentation are strictly those of the presenter and do not necessarily state or reflect the views of The Brattle Group, Inc.

Additional Resources

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