The case for introducing demand charges in residential tariffs

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Existing tariffs do not reflect the cost structure

Existing tariffs are typically two-part designs

- The first part is a fixed service charge ($/month)
- The second part is a non-time varying energy charge (cents/kWh)

This is true for network companies that only provide transmission and distribution services; it is also true for network companies that also provide regulated supply and for vertically integrated companies that provide supply, transmission and distribution services

Thus, utility revenue structures are not aligned with the underlying cost structures

Five currents have made change all but inevitable

- **Current 1.** The emergence of distributed generation, which has created inequities among residential customers
- **Current 2**. The realization that the cost-causation principle also applies to residential customers
- **Current 3**. The rollout of smart meters, which makes it relatively easy to offer demand charges
- **Current 4.** The need to improve load factor and clip peaks
- **Current 5.** The recognition that a few U.S. and European utilities have been offering demand or capacity charges for years

The onset of distributed generation has exposed the failings of existing tariffs

While network costs are largely fixed, the bulk of the revenues are variable under traditional volumetric tariffs

As growth slows down due to the deployment of distributed generation and "organic" conservation, networks face revenue risks

Ultimately, tariffs are raised for all customers, creating inequities as customers with low kW demand subsidize customers with high kW demand

With no demand charges, customers have no incentive to lower their kW demand, creating inefficiencies in the deployment of scarce capital

How some utilities are dealing with the issue

Mandating demand charges for distributed generation customers, arguing that they constitute a class by themselves

- In Arizona, two utilities are moving down this path

Giving distributed generation customers a choice between (a) paying a higher fixed charge or (b) paying standard fixed charge along with a demand charge

- In Kansas, Westar Energy is moving down this path

The theory of tariffs

Tariffs should promote economic efficiency and equity, but changes in tariff regimes should be implemented gradually

- For distribution-only utilities, this translates into a two-part rate, where the first part is a (fixed) service charge and the second part is a demand charge; for other utilities, into a three-part rate, where the third part is an energy charge
- In the US, with the exception of Texas, distribution utilities also provide regulated energy supply service

Such tariffs have been offered to commercial and industrial customers for the better part of the last century, inspired by the writings of Professor John Hopkinson in 1892 (see appendix)

Demand charges in the U.S.

19 U.S. utilities in 14 states offer them on an opt-in basis

- Included in this category are large utilities such as Duke Energy, Georgia Power, and Xcel Energy

With two exceptions, where participation rates are in the 8-10% range, the offerings have elicited weak customer enrollment, probably because of the way the tariffs are designed and marketed

The situation will change with the deployment of smart meters, which is nearing 40% of all U.S. households, and the realization that distributed generation resources are nearing a point of inflection

Capacity charges in Europe

Since the end of the Second World War, some countries have charged customers for energy based on a volumetric tariff and for capacity based on their connected load

- France
- Italy
- Spain

As smart meters are rolled out, the capacity charges will probably be modified to allow for the introduction of demand charges

Demand charges in Australia

The utilities are purely providing distribution network services

As in Texas, they are charging customers based on the amount of energy they purchase from retailers

This is totally out of kilter with their customer structure

Proposals are expected to be filed this fall with the regulator requesting a change, with some proposing to make a transition to demand charges

The ideal tariff will have five elements

Service charge

- Billing, metering and customer care

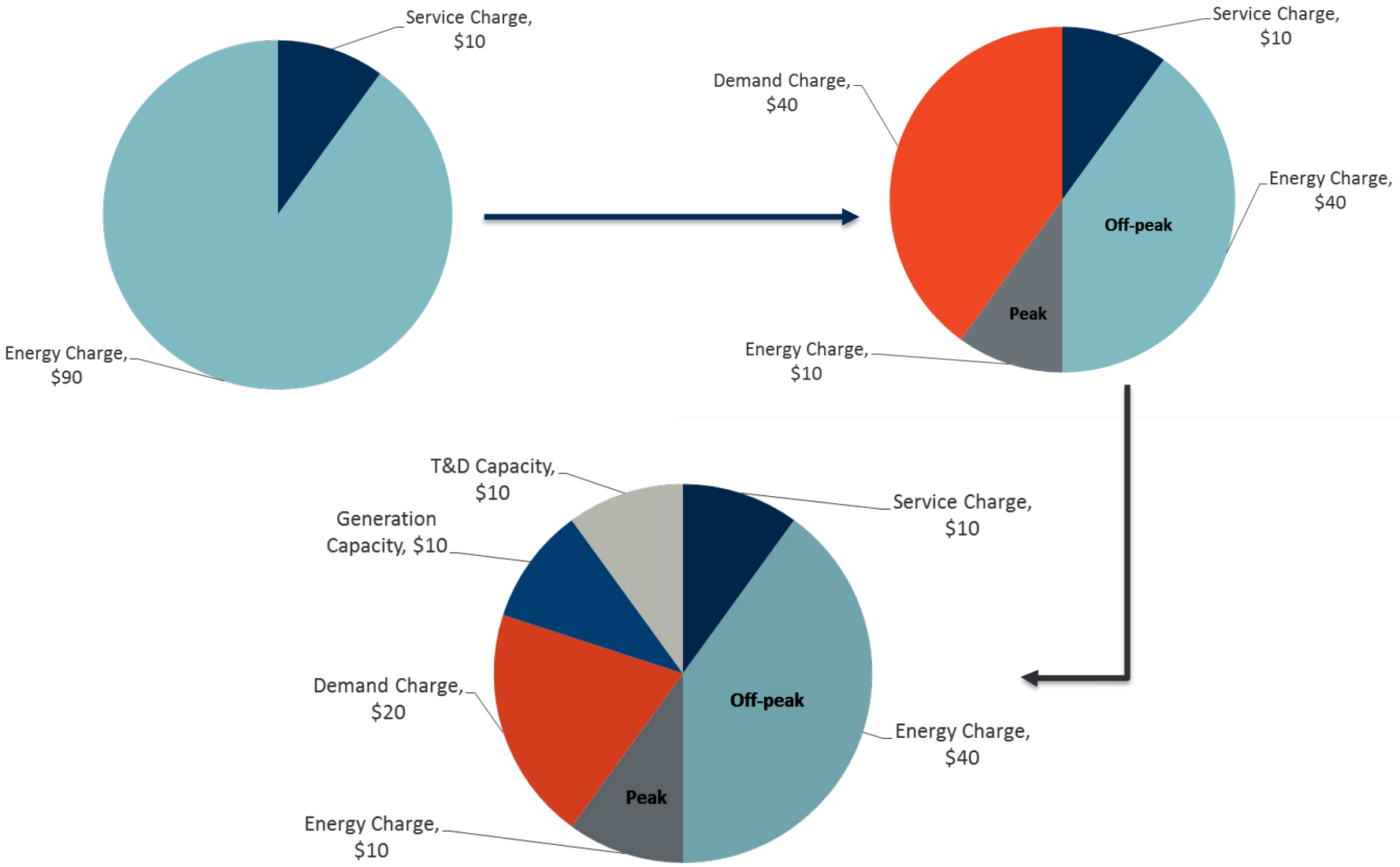
Demand charge

- A reservation charge for transmission and distribution capacity
- A reservation charge for generation capacity
- A demand charge for actual utilization of capacity

Energy charge

- Time varying

How a $100 customer bill might look like in the future



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Appendix

The chronology of tariff design (1)

Year	Author	Contribution
1882	Thomas Edison	• Electric light was priced to match the competitive price from gas light and not based on the cost of generating electricity
1892	John Hopkinson	• Suggested a two–part tariff with the first part based on usage and the second part based on connected kW demand
1894	Arthur Wright	• Modified Hopkinson's proposal so that the second part would be based on actual maximum demand
1897	Williams S. Barstow	• Proposed time-of-day pricing at the 1898 meeting of the AEIC, where his ideas were rejected in favor of the Wright system
1946	Ronald Coase	• Proposed a two-part tariff, where the first part was designed to recover fixed costs and the second part was designed to recover fuel and other costs that vary with the amount of kWh sold
1951	Hendrik S. Houthakker	• Argued that implementing a two-period TOU rate is better than a maximum demand tariff because the latter ignores the demand that is coincident with system peak
1961	James C. Bonbright	• Laid out his famous Ten Principles of Public Utility Rates

The chronology of tariff design (concluded)

Year	Author	Contribution
1971	William Vickrey	• Proffered the concept of real-time-pricing (RTP) in *Responsive Pricing of Public Utility Services*
1976	California Legislature	• Added a baseline law to the Public Utilities Code in the *Warren-Miller Energy Lifeline Act*, creating a two-tiered inclining rate
1978	U.S. Congress	• Passed the *Public Utility Regulatory Act (PURPA),* which called on all states to assess the cost-effectiveness of TOU rates
1981	Fred Schweppe	• Described a technology-enabled RTP future in *Homeostatic Control*
2001	California Legislature	• Introduced *AB 1X,* which created the five-tier inclining block rate where the heights of the tiers bore no relationship to costs. By freezing the first two tiers, it ensured that the upper tiers would spiral out of control
2001	California PUC	• Began rapid deployment of California Alternative Rates for Energy (CARE) to assist low-income customers during the energy crisis
2005	U.S. Congress	• Passed the *Energy Policy Act of 2005*, which requires all electric utilities to offer net metering upon request

The Hopkinson and Wright tariffs

The Hopkinson tariff contains an explicit demand charge

- E.g., demand charge = $2.50 per month per kW of maximum demand in the month, plus an energy charge of 5 cents per kWh per month

It was followed by the Arthur Wright tariff, which achieves the same objectives without requiring the measurement of demand

- The Wright tariff uses a declining block rate structure where the charge for energy might be 10 cents per kWh for the first 50 hours of use and 5 cents for the next 50 hours of use and so on

Presenter Information

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Ahmad Faruqui, a principal with The Brattle Group, leads the firm's practice in understanding and managing the changing needs of energy consumers. This work encompasses tariff design and evaluation, distributed generation, energy efficiency, demand response, demand forecasting and cost-benefit analysis of emerging technologies. He has consulted with more than 125 clients, including utilities, system operators, and regulatory commissions, in the US and in Australia, Canada, Egypt, Hong Kong, Jamaica, Philippines, Saudi Arabia and Thailand. He has filed testimony or appeared before state commissions, government agencies, or legislative bodies in Alberta (Canada), Arizona, Arkansas, California, District of Columbia, Illinois, Indiana, Kansas, Maryland, Michigan and Ontario (Canada). He has spoken at conferences in Australia, Bahrain, Brazil, Egypt, France, Germany, Ireland, Jamaica, and the United Kingdom. His work has been cited in publications such as *Business Week, The Economist*, *Forbes, The New York Times*, *USA Today*, *The Wall Street Journal* and *the Washington Post*. He has appeared on Fox News and National Public Radio. The author, co-author or co-editor of four books and more than 150 articles dealing with energy economics, he holds bachelors and masters degrees from the University of Karachi and masters and doctoral degrees from the University of California, Davis, in economics and in agricultural economics.