

# The case for introducing demand charges in residential tariffs

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# Existing tariffs do not reflect the cost structure

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## 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

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- **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

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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

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**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

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**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.

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## **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

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**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

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**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

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## Service charge

- Billing, metering and customer care

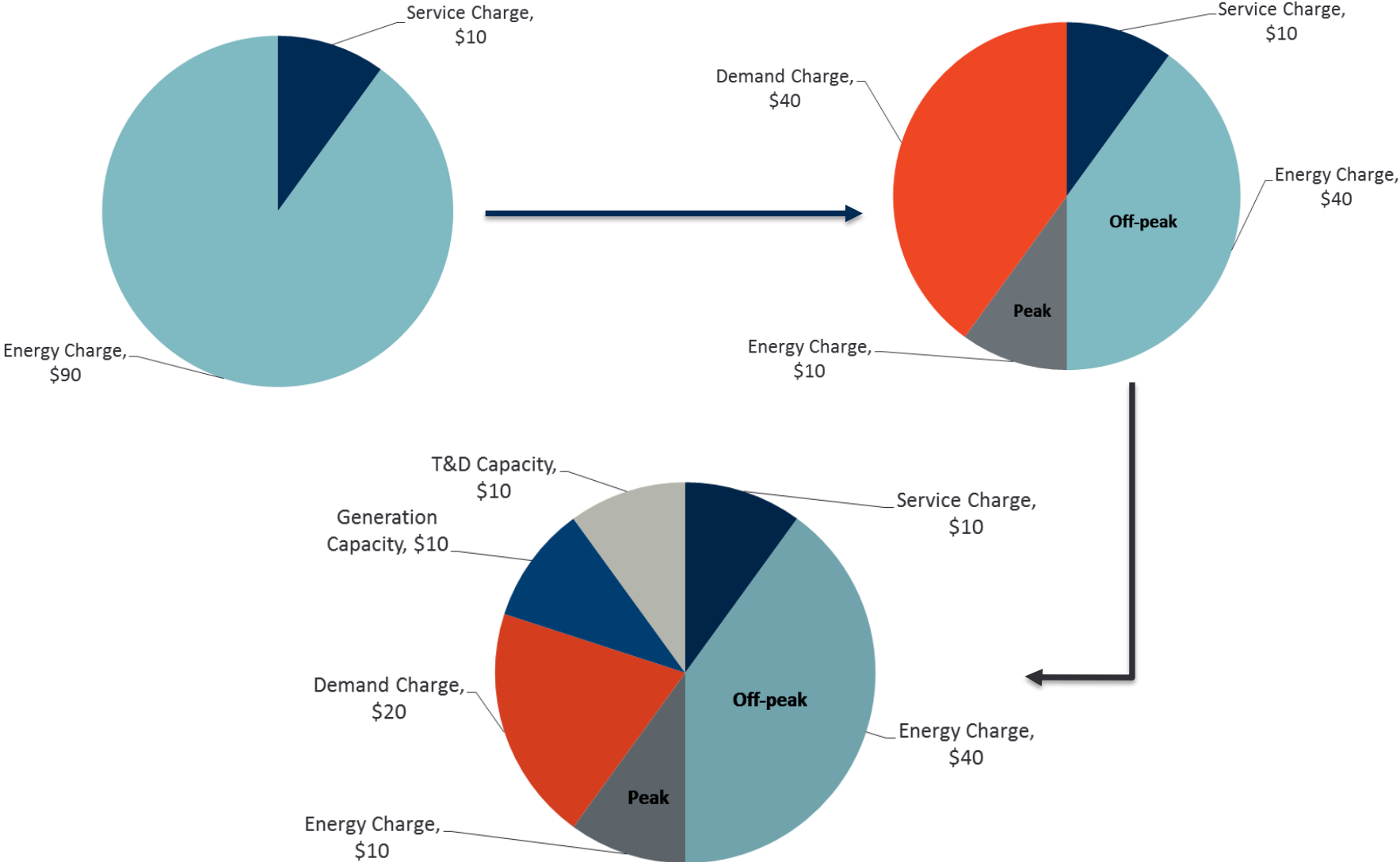
## Demand charge

- 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	<ul style="list-style-type: none"><li>Electric light was priced to match the competitive price from gas light and not based on the cost of generating electricity</li></ul>
1892	John Hopkinson	<ul style="list-style-type: none"><li>Suggested a two-part tariff with the first part based on usage and the second part based on connected kW demand</li></ul>
1894	Arthur Wright	<ul style="list-style-type: none"><li>Modified Hopkinson's proposal so that the second part would be based on actual maximum demand</li></ul>
1897	Williams S. Barstow	<ul style="list-style-type: none"><li>Proposed time-of-day pricing at the 1898 meeting of the AEIC, where his ideas were rejected in favor of the Wright system</li></ul>
1946	Ronald Coase	<ul style="list-style-type: none"><li>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</li></ul>
1951	Hendrik S. Houthakker	<ul style="list-style-type: none"><li>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</li></ul>
1961	James C. Bonbright	<ul style="list-style-type: none"><li>Laid out his famous Ten Principles of Public Utility Rates</li></ul>

# The chronology of tariff design (concluded)

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Year	Author	Contribution
1971	William Vickrey	<ul style="list-style-type: none"><li>Proffered the concept of real-time-pricing (RTP) in <i>Responsive Pricing of Public Utility Services</i></li></ul>
1976	California Legislature	<ul style="list-style-type: none"><li>Added a baseline law to the Public Utilities Code in the <i>Warren-Miller Energy Lifeline Act</i>, creating a two-tiered inclining rate</li></ul>
1978	U.S. Congress	<ul style="list-style-type: none"><li>Passed the <i>Public Utility Regulatory Act (PURPA)</i>, which called on all states to assess the cost-effectiveness of TOU rates</li></ul>
1981	Fred Schweppe	<ul style="list-style-type: none"><li>Described a technology-enabled RTP future in <i>Homeostatic Control</i></li></ul>
2001	California Legislature	<ul style="list-style-type: none"><li>Introduced <i>AB 1X</i>, 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</li></ul>
2001	California PUC	<ul style="list-style-type: none"><li>Began rapid deployment of California Alternative Rates for Energy (CARE) to assist low-income customers during the energy crisis</li></ul>
2005	U.S. Congress	<ul style="list-style-type: none"><li>Passed the <i>Energy Policy Act of 2005</i>, which requires all electric utilities to offer net metering upon request</li></ul>

# The Hopkinson and Wright tariffs

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## 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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