Smart Rate Design for a Smart Future, Appendix D

The Specter of Straight Fixed/Variable Rate Designs and the Exercise of Monopoly Power

By Jim Lazar

Introduction

A number of electric utilities have proposed what is called "straight fixed/variable" rate design (SFV), in which all costs claimed to be "fixed costs" are recovered in a fixed monthly charge, and only those costs that are considered "variable" are recovered on a per kilowatt-hour (kWh) basis. While most have focused only on distribution costs, a few have gone further, proposing that generation and transmission investment-related costs be included in monthly fixed charges.[1]

In accounting terms, the only truly "fixed" costs are interest and depreciation. All other costs, including the shareholder return, associated income taxes, labor, and revenue-sensitive costs are technically "variable" costs — they change from month to month and from year to year. Utilities often define "fixed costs" very loosely, including these other costs, as well as all distribution costs and sometimes even some generation-related costs in this category.

High fixed charges provide utilities with stable revenues, but have many adverse impacts on electric consumers and energy policy. We discuss some of these below.

Disincentives to Public Policy Goals

Energy Efficiency

Given a defined electric revenue requirement, a higher fixed charge results in a lower per kWh rate. Table D-1 shows an illustrative example, comparing a utility with a typical customer charge of $7.00/month and a $.10/kWh energy charge with one imposing a $57/month customer charge, but only a $.05/kWh energy charge. Both have the same bill — $107.00/month — for the average customer, but the higher customer charge results in a 44% larger bill for a typical apartment dweller or other small user, and a savings of 29% for a very large home.

Table D-1

Example of Fixed Charge Effect

Rate Design		Typical Rate	SFV Rate	Difference
Customer Charge		$7.00	$57.00	
Energy Charge		$0.10	$0.05	
Customer Bills	**kWh/month**			
Average Customer	1000	$107.00	$107.00	0%
Apartment Dweller	500	$57.00	$82.00	44%
Extra-Large Residence	2500	$257.00	$182.00	-29%

The impact of this on customer-driven energy efficiency can be quite dramatic. A high-efficiency air conditioner or window replacement that might have a 5-year payback period for the consumer at $.10/kWh would have a 10-year payback at $.05/kWh. Many consumers will be hesitant to invest in energy efficiency if the savings are smaller.

Competitive Impact on Renewable Energy Development

The same adverse effect can result for customer renewable energy development. A customer who might invest in a solar photovoltaic system when they can avoid $.10/kWh in the utility rate may be able to put together a combination of tax incentives and financing to make this an attractive investment. At $.05/kWh, it is much less likely. At the same time, a low-use (high efficiency plus on-site solar) custom-

1 For example, Madison Gas and Electric in 2014 proposed a $57/month fixed charge, and Hawaiian Electric Company proposed a $55/month fixed charge, plus an additional $16/month for customers with photovoltaic systems. The MG&E proposal was resolved with a $19/month customer charge, and the HECO proposal was significantly modified to a $25 monthly minimum bill, and a lower credit of only $0.18/kWh for excess solar energy exported to the grid from new PV installations.

er considering going off the utility grid would have a much stronger incentive to do so. The cost of their storage bank would only need to compete with the high fixed cost attributable to the average customer, but since they produce much of their power on-site, they would need a smaller than average storage capacity to store a portion of their power needs. The customer, of course, would then be obligated to supply all his/her power needs. Losing a customer permanently further exacerbates the lost revenue issue.

Low-Income Households

The vast majority of low-income households use below-average amounts of electricity, and will pay higher bills with an SFV rate design. Table D-2 shows an analysis prepared

Table D-2

Low-Income Household Usage

Average 2009 household electricity usage (kWh) by status above or below 150% of poverty

Energy Information Administration, Residential Energy Consumption Survey Reportable Domain	Average Usage (kWh) Sorted by Income Level			Percentage Difference Between Average KWH Low-Income and Non-Low-Income Households
	Above 150% Poverty Level	At or Below 150% Poverty Level	All Households	
Connecticut, Maine, New Hampshire, Rhode Island, Vermont	8,453	5,920	7,940	**-30.0%**
Massachusetts	7,364	5,353	6,967	**-27.3%**
New York	7,039	5,431	6,578	**-22.8%**
New Jersey	9,155	6,760	8,902	**-26.2%**
Pennsylvania	10,733	8,992	10,402	**-16.2%**
Illinois	10,771	9,430	10,392	**-12.5%**
Indiana, Ohio	11,559	10,224	11,220	**-11.6%**
Michigan	9,206	7,508	8,695	**-18.4%**
Wisconsin	8,827	7,961	8,672	**-9.8%**
Iowa, Minnesota, North Dakota, South Dakota	11,288	8,198	10,719	**-27.4%**
Kansas, Nebraska	10,800	10,030	10,633	**-7.1%**
Missouri	13,775	13,602	13,740	**-1.3%**
Virginia	15,088	11.237	14,442	**-25.5%**
Delaware, District of Columbia, Maryland, West Virginia	14,437	12,711	14,100	**-12.0%**
Georgia	15,452	13,823	14,917	**-10.5%**
North Carolina, South Carolina	14,717	12,620	14,045	**-14.2%**
Florida	15,679	12,358	14,858	**-21.2%**
Alabama, Kentucky, Mississippi	16,307	12,915	15,236	**-20.8%**
Tennessee	15,766	13,512	15,132	**-14.3%**
Arkansas, Louisiana, Oklahoma	14,852	13,560	14,392	**-8.7%**
Texas	15,157	11,816	14,277	**-22.0%**
Colorado	7,745	5,752	7,439	**-25.7%**
Idaho, Montana, Utah, Wyoming	11,349	13,126	11,753	**15.7%**
Arizona	14,970	11,218	14,105	**-25.1%**
Nevada, New Mexico	10,580	9,643	10,369	**-8.9%**
California	7,256	5,732	6,888	**-21.0%**
Alaska, Hawaii, Oregon, Washington	12,841	11,726	12,570	**-8.7%**
Total	**11,734**	**10,692**	**11,320**	**-14.2%**

by the National Consumer Law Center that examines the usage of low-income households. It shows that households below 150% of the federal poverty level use between 9% and 30% less electricity than the average of all households.

However, there are some low-income households with high electricity usage, including large (sometimes multigenerational) households, but in most cases this is the result of low levels of energy efficiency that can be addressed with programmatic conservation. In general, low-income advocates, consumer advocates, and environmental advocates favor addressing the special needs of these families with specific programmatic approaches or direct financial assistance, rather than setting a base rate design that favors high-users.[2]

Apartment and Urban Dwellers

Multi-family housing residents also have below-average usage and are adversely impacted by high fixed charge rate designs. These residents typically have below-average dwelling size, below-average residents per household, and below-average usage. They are also quite obviously cheaper to provide electric distribution service to — since they are close together and many customers are served by a single distribution transformer. As we discuss in Chapter IV, this has many impacts on the cost of utility service and appropriate rate design.

SFV Can Cause a 15% Increase in Electric Consumption

When Madison Gas & Electric originally proposed a $69/month customer charge, it also proposed reducing the per kWh rate from $.14/kWh in winter and $.15/kWh in summer to about $.04/kWh. Using the economic principle of elasticity (higher prices result in a lower quantity demanded), and applying a moderate elasticity factor of -0.2 (a 1% increase in price results in a 0.2% reduction in usage), The Regulatory Assistance Project estimated that the proposed rate design could result in about a 14.5% increase in usage over time.[3] The expectation is that consumers would raise thermostats, defer efficiency investments, and be less attentive to simple things like turning off unused lights.

Other Potential Adverse Impacts

A utility with a high fixed monthly charge may invite several kinds of undesirable and even dangerous behaviors by consumers.

Risky connections in Delhi, India

The first of these is informal master-metering, where more than one household is served through a single meter. This can happen when houses are divided into a primary residence and an accessory dwelling unit (mother-in-law apartment). However, if the monthly fixed charge is low, the owner will normally have a second meter installed for the second dwelling so that both occupancies pay for their own electricity. These type of "ohana" (extended-family) units account for as much as 15% of the housing stock in parts of Hawaii.

The second is more dangerous: connecting multiple dwellings together with less-than-utility-grade wiring. This is very common in some countries, and creates safety risks for residents and reliability risks for the electric distribution system (see photo from India).

Third, high fixed monthly charges may result in some seasonal consumers completely disconnecting service during part of the year. This actually increases costs for utilities, since they must handle the customer service call twice. At the same time it inconveniences the consumer. The electric distribution system is unchanged during this period when service to individual customers is

2 Testimony of John Howat, National Consumer Law Center, Wisconsin PSC Docket No. 3270-UR-120.

3 For an explanation of how rate design and elasticity affects usage, see Lazar, J. (2013). *Rate Design Where Advanced Metering Infrastructure Has Not Been Fully Deployed*, Appendix A. Montpelier, VT: The Regulatory Assistance Project. Available at: www.raponline.org/document/download/id/6516

suspended. Some utilities have responded by imposing high reconnection charges when the customer initiates service, but this may also adversely affect rental properties where move-in / move-out changes of service are common, and often involve lower income consumers. As in other situations involving low-use customers, the electric distribution system is not changed by the coming or going of an individual consumer.

Principle: Customers Should Be Able to Connect to the Grid at Reasonable Cost

Based on the discussion in the early chapters of "Smart Rate Design for a Smart Future," we derived our first principle of electricity pricing:

A customer should be able to connect to the grid for no more than the cost of connecting to the grid: This should reflect only those costs to the system that the *addition* of the customer adds, such as billing and metering, not the distribution infrastructure.

The Foundation of Regulation Is the Prevention of the Exercise of Monopoly Power

The imposition of a fixed charge for the privilege of being a customer is almost non-existent in the competitive world. Oil refineries, hotels, airlines, and supermarkets have significant fixed costs, including building and equipment. Even their labor costs do not vary directly with sales volumes. But all of these recover all their fixed and variable costs through volumetric prices. In a competitive environment, it is essentially impossible to charge a customer for the privilege of being a customer. In fact, we find quite the opposite — special discounts offered to attract new customers, to try to build a business relationship that will then continue over time.

The original purpose of public service company regulation was to prevent the exercise of pricing power by businesses that had a local monopoly over service. The earliest of these were the regulations imposed on overnight lodging in medieval England, while the modern framework of utility regulation in the United States began with railroads and associated businesses.

Munn vs. Illinois

One landmark case involved a grain elevator operator who owned the only facilities that farmers could use to load their products onto the railroads. The alternative was to haul the grain a long distance, not an easy proposition in the era of horse-drawn wagons.

In Munn v. Illinois, the US Supreme Court ruled that businesses "affected with the public interest" could be subject to regulation by states. In that decision, the Court stated:

> *"In countries where the common law prevails, it has been customary from time immemorial for the legislature to declare what shall be a reasonable compensation under such circumstances, or perhaps more properly speaking, to fix a maximum beyond which any charge made would be unreasonable."*[4]

This principle evolved over time to give state utility regulators the authority to fix the specific tariffs for electric service, and most state laws require that these be "fair, just, and reasonable" or similar subjective legislative criteria. This prevented the exercise of monopoly pricing power over consumers who had no other utility available to them.

Where utilities are allowed to impose high fixed monthly charges, this becomes an exercise of monopoly pricing power. As Charles Cicchetti, former chairman of the Wisconsin Public Service Commission, recently stated with respect to the Wisconsin Electric Power Company proposal to recover its generation, transmission, and distribution investment-related costs in fixed monthly charges:

> *"WEPCO invokes mostly outdated and previously rejected logic in an attempt to convince the Commission to let it use its utility monopoly and mostly very limited customer choice to force customers to absorb risks in an unjust and unreasonable manner, which is contrary to economic and public policy objectives."*[5]

Imparting to Natural Monopolies the Pricing Discipline That Is Imposed By Competitive Markets

Another important role of utility regulation is to impart to natural monopolies (as electric distribution utilities are generally categorized) the same pricing discipline that competitive firms experience, so that they endeavor to minimize costs and maximize customer satisfaction. If utilities are allowed to recover their system costs in fixed charges for the privilege of being a customer, much of this discipline is lost. Conversely, if they recover their costs in

4 Munn v. Illinois, 94 U.S. 113 (1877)

5 Testimony of Charles Cicchetti, Wisconsin Public Service Commission, Docket No. 05-UR-107 (2014), p. 25.

the per kWh price, they must compete with alternatives to electricity consumption from the utility, including energy efficiency and customer self-generation. This discipline helps to hold costs down for all consumers.

Universal Service Policies

Universal access to electricity service has long been recognized as desirable for social, health, safety, and other reasons. In the United States, electric utilities expanded service to urban areas and to large businesses in the late years of the 19th century, but at the time of the great depression most rural areas were still without electric service because the cost to expand distribution systems was not profitable.

The Congress responded by creating the Rural Electrification Administration (REA, now the Rural Utility Service or RUS) to help expand electricity to rural areas.[6] Lyndon Johnson's first campaign for Congress in 1936 had as a key campaign issue to secure electricity service for rural Texas; he came from an area now served by the Pedernales Electric Cooperative, headquartered in Johnson City. The REA provided interest-free loans and grants to help make universal service to smaller communities possible. The electrification of these communities was viewed as important to help these communities survive and prosper.

The United Nations Secretary General's Advisory Group on Energy and Climate Change[7] has set a goal to extend basic electricity service to 99% of the population of the world. The definition of "basic" service includes provision of lighting (so that students can continue their studies after sunset) and refrigeration (to reduce food-borne illness). The level of consumption is 50 kWh per month per person to meet these basic needs. In the United States and other developed countries, the "basic" needs level of service is higher than the developing world figure used by the UN, on the order of 300–400 kWh/month/household.

SFV rate design strikes directly at universal service, because it makes electricity service, even for the most basic and essential uses, unaffordable to low-income households. It does this (even if they are densely located in urban areas where distribution costs are very low), by averaging their cost of service with suburban and rural areas where per customer distribution costs are very different. In effect, under SFV pricing, low-income households are made to subsidize higher-income, higher-usage households.

Regulate Price Where Competitive Market Does Not Exist to Set Price

Finally, a key role of utility regulation is to set prices where a competitive market does not exist to impose prices on suppliers. Electricity distribution service remains such an area of commerce in nearly all communities in the United States. The role of the regulator is to implement prices equivalent to what would be charged by a competitive market, were one present.

As we discuss below, in other competitive markets the monthly charge for "connection to the system" is usually zero, and even where it is greater than zero it is normally very small.

The Relationship Between Fixed Costs and Fixed Charges

Utilities often argue that the majority of their costs are fixed, and extrapolate from this that these fixed *costs* should be recovered in fixed *charges*. This is lacking in both economic foundation and accounting principles:

Just because a cost is fixed in the short run does not mean it should be recovered in a fixed charge.

Utilities often assert that most of their costs are "fixed" and should be recovered in fixed charges. While interest and depreciation expense are fixed in the short run, virtually every other cost is variable even in the short run.

Even if a cost is "fixed" it does not mean it should be recovered in a fixed charge. Investments in power plants are made to provide a supply of electricity, and the costs should be recovered in proportion to how much of that production a customer uses (this is discussed in Chapter V of the main text, when considering the various dimensions of usage that are measured and priced). Transmission facilities are built to connect remote power plants to the communities needing power, and are essentially an alternative to building those power plants directly in the community.

The decision to build distribution systems is made where

6 For detail on the RUS, see: http://www.rd.usda.gov/about-rd/agencies/rural-utilities-service.

7 Energy for Sustainable Future, the Secretary-General Advisory Group on Energy and Climate Change, United Nations Industrial Development Organization, 2010.

there is a sufficient market to justify the cost, not based on how much each individual consumer will use or how many consumers will be served. Nearly every utility has a "line extension policy" that dictates where the utility will build distribution facilities, and under what circumstances the customers seeking service must pay for the line extension. A circuit serving 10 large customers, each using 100,000 kWh/month will attract investment as easily as a circuit serving 1,000 customers each using 1,000 kWh/month. All of these investments have elements of fixed costs, but this does not mean they should be recovered in fixed charges.

Utility labor costs are often thought of as fixed in the short-run, but during the 2008 economic crisis some utilities reduced staffing by as much as 10% to preserve earnings in the face of sharp reductions in industrial activity. In a financial crisis, maintenance is deferred, customer service quality is impaired, and even administrative costs are cut.

There is a sound argument that individual customers should pay the direct costs of their customer-specific costs. Historically, this has been interpreted by many utility regulators as the cost of meters, service drops, meter reading, billing, and collection. These costs are normally calculated in the range of $5–$10/month, but even the meter reading, billing, and collection costs are variable costs that are a function of how often bills are rendered. The additional cost of smart meters is justified by many benefits beyond the simple measurement of usage (see Chapter IV of the main text), and this additional cost is not properly considered customer-related. The primary reason for monthly billing is not to collect the $5–$10/month in customer-specific costs, but to collect the $50–$150/month in electricity usage charges; if usage were very small, quarterly billing would be adequate. Thus, even these monthly billing costs are related to usage.

A recent posting by Severin Borenstein, professor and director emeritus of the University of California Energy Institute, addresses this in detail, and utterly discredits the suggestion that fixed costs should translate into fixed charges. He states:

> *But the mere existence of system wide fixed costs doesn't justify fixed charges. We should get marginal prices right, including the externalities associated with electricity production. We should use fixed charges to cover customer-specific fixed costs. Beyond that, we should think hard about balancing economic efficiency versus fairness when we use additional fixed charges to help address revenue shortfalls.*[8]

A cost-based fixed charge recovers those costs that vary with the number of customers.

The debate in rate design as to what costs belong in the monthly customer charge often follows on the related debate in cost allocation as to which costs are customer-related in nature. While some regulators have allowed distribution infrastructure costs to be classified as customer-related, most have directed that only customer-specific costs be classified as customer-related, and it follows that only those customer-specific costs be included in the monthly fixed customer charge.

These issues were heavily debated in most states during the PURPA proceedings of 1978–1982, and most states resolved these issues in favor of a narrow definition of customer-related costs. Most regulators have adhered to these principles since.

For example, the Illinois PUC recently ruled that the mere fact that costs are "fixed" in some short-term sense should not guide rate design:

> *"The Companies' proposed SFV rate design diverges from cost-causation, substituting its "fixed" cost designation for cost causation as the determinative allocator. …*
>
> *"By failing to send proper price signals, the Companies' proposed rate design denies consumers who conserve the benefit of their actions, and punishes customers who are frugal. The proposed SFV charges are indifferent to efficiencies in usage and demand. In contrast, the Commission has recognized that lower monthly customer charges and higher volumetric charges can advance energy use conservation and efficiency policy objectives by providing a greater price signal.*
>
> *"The Commission finds that Staff's and Intervenor's arguments in favor of assigning demand-based costs to volumetric charges are consistent with energy efficiency and the avoidance of cross subsidies."*[9]

Calculated Example

It is relatively straightforward to calculate an example of how customer-related costs translate into customer charges that are cost-based, and recover only customer-specific costs in per-customer fixed charges; see Table D-3.

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8 Borenstein, S. (2014, November 3). *What's So Great About Fixed Charges?* See https://energyathaas.wordpress.com/2014/11/03/whats-so-great-about-fixed-charges/

9 Illinois Commerce Commission, People's Gas, Docket 14-0224, 2015.

Table D-3

Calculated Example	
Calculation of Per-Customer Costs	
Service Drops	$100,000
Meters	$100,000
Subtotal Rate Base	$200,000
Allowed Return With Taxes	12%
Allowed Return	$24,000
Depreciation Expense	$8,000
Subtotal Capital Costs	$32,000
Meter and Service Maintenance	$5,000
Billing and Collection Costs	$25,000
Subtotal Operating Costs	$30,000
Total Customer-Related Costs	$62,000
Customers Serviced	1,000
Annual Cost/Customer	$62.00
Monthly Cost/Customer	$5.17

How Competitive Markets Address The Fixed Cost/Fixed Charge Issue

A principal purpose of regulation is to impose on natural monopolies the same discipline that competitive firms face in setting unregulated prices. Every business has costs that are fixed in the short run, and every profitable firm recovers these in a manner that enables them to attract customers and price their product effectively to address competitive pressure. In almost all cases, the result is that fixed costs are recovered volumetrically.

Gasoline

American consumers spend about the same proportion of their income on gasoline as on electricity, but gasoline trades in a competitive, largely unregulated market. The entire gasoline supply stream involves immense investments that are at least as "fixed" as electric utility distribution systems. Oil wells involve huge drilling expense. Oil tankers are very expensive. Oil refineries cost billions of dollars to build. The pipeline network that brings the crude oil to the refineries, and the product pipelines that move finished products from the refineries to the communities where it is consumed are fixed assets. Even the local oil terminal, tanker trucks, and service stations or mini-marts involve extensive investment.

Figure D-1

Unbundled vs. Bundled Pricing for Gasoline

Crude Oil	$2.237
Tanker to Refinery	$0.114
Refinery Capital	$0.213
Refinery Operating	$0.235
Product Pipeline	$0.113
Terminal Rack	$0.023
Truck to MiniMart	$0.114
MiniMart Profit	$0.217
State Taxes	$0.349
Federal Taxes	$0.184

These costs are all recovered in a single price per gallon of gasoline at the pump, and no attempt is made to impose a separate "subscription" charge from the usage charge, or to separate out (itemize or unbundle) the cost of gasoline. Customers compare stations based on the ultimate price per gallon (and other factors, including brand, convenience, and real or perceived differenced in quality) on a basis that combined all fixed and variable costs into a single price per gallon.

Think about which of the two pricing approaches in Figure D-1 is most useful to you in making a gasoline purchase decision comparing two gas stations.

Groceries

Consumers spend even more of their budget on groceries than on gasoline or electricity. Like gasoline, the grocery supply chain is immense, bringing products from around the globe to a supermarket near where we live. Supermarkets do not charge admission fees and, except in dense urban areas, provide free parking completely independent of how much a customer spends. However, prices are slightly different depending on how the customer "connects to the grocery grid." A large chain like Kroger, Albertson's, or Wal-Mart has lower prices than a neighborhood mini-mart — but the customer incurs the cost of traveling to the supermarket to secure those lower prices. In essence, they bear the cost of connecting to the "grocery grid" at a more centralized point. But in both cases the fixed (and variable) costs of the grocer are reflected in the per-unit prices of their products. We discuss membership stores such as Costco and Sam's Club separately.

Membership Discount Stores: They DO Charge to "Be a Customer"

Membership stores like Costco and Sam's Club DO charge a "membership fee" for customers to gain admission. They do this for a simple reason: to reduce the number of "shoppers" versus "buyers" in their stores, in order to increase the volume of product that can be sold from a given store size.

In essence, these stores provide consumers an opportunity to "connect to the grid" at a wholesale level, rather than a retail level.

However, even for these stores, the membership fee reflects a very small portion of annual revenues, about 2%–4%; for an electric utility that would equate to a customer charge of $2/month to $4/month, based on an average monthly bill nationally of about $100/month.

But even the membership fee may be rebated. Costco has two membership tiers, $55/year and $110/year for "Executive" membership. The Executive membership comes with a 2% annual rebate on purchases — and is marketed by Costco to their larger consumers. Most Executive members receive rebates that approximate or exceed their annual membership dues.

In addition, virtually every product available from a membership store is also available (generally in smaller package sizes) at supermarkets or discount stores like Target and Wal-Mart, without a membership fee. Consumers who do not buy enough to justify the membership fee can easily avoid it, unlike electric consumers who do not have a realistic alternative to the electric utility service.

The electricity service equivalent would be if a customer built their own connection to the utility at the primary voltage level — and then would pay a much lower price (as large industrial consumers do) for their service. Customers that connect to the grocery grid at the "distribution" level of their neighborhood supermarket pay slightly higher prices than at warehouse stores.

Hotels

Large hotels often involve tens of millions of dollars of investment (into the billions for destination mega-resorts.) They recover these costs on a per-room per-day basis. But they employ sophisticated pricing models in doing so, varying pricing based on demand for rooms, season of the year, and with discounts for large-volume buyers (convention rates). We will not defend the lack of transparency in hotel pricing, but will note that search tools like Hotwire, Priceline, and Trivago have made it possible for individual consumers to receive many of the pricing advantages that larger buyers achieve.

The dynamic pricing for hotel rooms (and for airline tickets and rental cars) has been the foundation on which many proposals for electric dynamic pricing (see discussion in main paper) have been based.

Making Electricity Pricing Comparable

To make electricity pricing comparable to that for gasoline, groceries, or hotel rooms would not actually be very difficult. First, different prices based on where the customer connects to the grid would be developed; most utilities already have these, with separate rates for customers served at secondary, primary, and transmission voltage. Next, the prices for all electricity would be on a volumetric basis, but differentiated by time of day, season of year, geographic zone, and with dynamic elements that would raise prices when electricity is scarce and discount it when it is at risk of being wasted. This is discussed in Chapter V of the main tect.

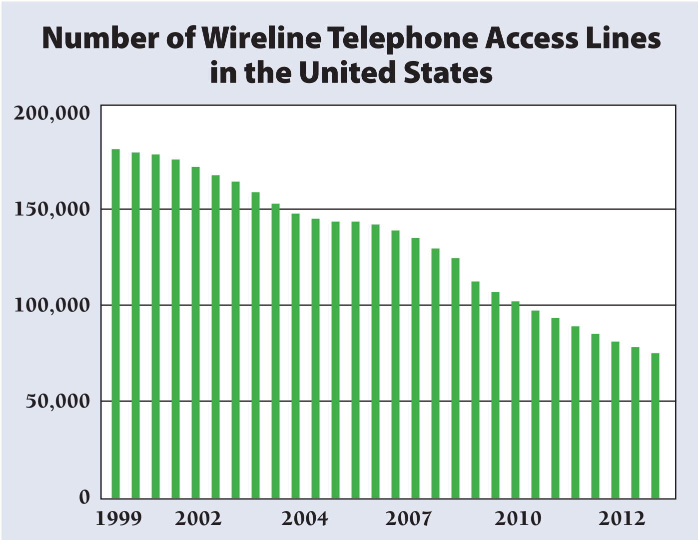
The Experience with Telecom

Some analysts point to the telecommunications industry as an example in which consumers pay high monthly fixed charges for cellular "plans" and pricing is not volumetric. This is somewhat inaccurate, and the history of telecommunications deregulation is instructive for some potential pitfalls of high fixed-charge pricing for electricity.

Prior to 1980, telephone companies were integrated providers of local and long-distance phone service. Each long-distance call contributed a few cents per minute to the local carrier, and this allowed the per-month rates for basic telephone service to be very low.

When long-distance competition began in the 1980s, customers needed to use "dial-around" systems to reach competitive services. They would dial a local number to a competitive carrier, dial in additional information, and the competitive carrier would connect the call to the destination city and place a local call there to make the connection. Large companies installed sophisticated "least

Figure D-2



cost routing" systems to do this automatically. These had a modest impact on the financial health of local exchange carriers (traditional phone companies).

Later, federal policy required local exchange carriers to allow customers to choose their long-distance carrier. At that time, an "access charge" was imposed at the federal level to compensate local carriers for a portion of the lost revenues, "termination fees" were imposed so the receiving phone company received compensation for delivering the connection at the receiving end, and long-distance prices dropped sharply.

This proved inadequate to replace all of the lost margins, and local exchange carriers petitioned state regulators to sharply increase their monthly fixed charges. In many parts of the county, the combined effect of the local rate design and the federal access charges raised the monthly fixed charge for telephone service from about $6/month to $30/month or more. The result has been dramatic: local exchange carriers have lost more than half of their customer access lines.

Does this mean that customers are making and receiving fewer calls? Certainly not. Or are less able to transmit documents, or access data services? Hardly. All of these services have moved to competitive suppliers, and in parts of the country local exchange carriers are abandoning territory and facing financial distress. The local exchange carriers have effectively priced themselves out of traditional markets with high fixed charges.

Some of these carriers have been successful by building fiber optic systems to deliver high-speed Internet, television, and other content. By bundling services together, they have built viable business models. But other competitors have entered the market to provide low-cost basic telephone service.

- Tracfone provides cellular service for as little as $7/month, including voice, text, voicemail, and even Internet service — on a pay-per-minute basis, with approximately 1,000 minutes per year provided on an "annual plan" available through discounters. Other prepaid cellular companies include Virgin Mobile, Cricket, and Consumers Cellular.
- Straighttalk provides both cellular and voice-over-internet-protocol (VOIP) service, with unlimited calling for $10–$15 per month, marketed through Wal-Mart stores.
- Magic-Jack provides VOIP service for as little as $50/year with unlimited calling for those with broadband Internet access.
- Skype provides local and long-distance unlimited VOIP service for as little as $25/year, including video communication and video conferencing.
- Federally subsidized "lifeline" phone service for low-income households is migrating from fixed line to cellular service, in part to avoid high fixed-line charges.

Many telephone services are now offered on a fully bundled "all-you-can-eat" basis. These are attractive to high-use customers, and sometimes chosen by less knowledgeable small users. But competitive firms offering service with very low fixed fees are widely available.

Addressing Revenue Stability Concerns

Electric utilities companies are concerned about rate design in part because under traditional volumetric rate design declining sales results in declining profits. This is a real issue. A study prepared on one electric utility showed that a 2% decline in sales would result in a 24% reduction in net earnings.

There are many ways to address revenue stability issues, and high monthly fixed charges are probably the worst option from a customer impact perspective. A discussion of several alternatives follows.

Table D-4

Impact on Earnings of Sales Decline for Illustrative SW Electric Utility[10]

% Change in Sales	Revenue Change		Impact on Earnings		
	Pre-tax	After-tax	Net Earnings	% Change	Actual ROE
5.00%	$9,047,538	$5,880,900	$15,780,900	**59.40%**	17.53%
4.00%	$7,238,031	$4,704,720	$14,604,720	**47.52%**	16.23%
3.00%	$5,428,523	$3,528,540	$13,428,540	**35.64%**	14.92%
2.00%	$3,619,015	$2,352,360	$12,252,360	**23.76%**	13.61%
1.00%	$1,809,508	$1,176,180	$11,076,180	**11.88%**	12.31%
0.00%	$0	$0	$9,900,000	**0.00%**	11.00%
-1.00%	-$1,809,508	-$1,176,180	$8,723,820	**-11.88%**	9.69%
-2.00%	-$3,619,015	-$2,352,360	$7,547,640	**-23.76%**	8.39%
-3.00%	-$5,428,523	-$3,528,540	$6,371,460	**-35.64%**	7.08%
-4.00%	-$7,238,031	-$4,704,720	$5,195,280	**-47.52%**	5.77%
-5.00%	-$9,047,538	-$5,880,900	$4,019,100	**-59.40%**	4.47%

Revenue Regulation

Most utility regulators set prices for electricity, and let revenues float as sales volumes deviate from assumed levels. An alternative, revenue regulation (or “decoupling”), works differently: the regulator sets an allowed level of revenue and periodically allows minor adjustments in prices to ensure the utility recovers the allowed revenue. More than half of the US states have employed some form of this, as shown in Figure D-3.

Incentive Regulation

A number of regulators have adopted various forms of incentive regulation to reward utilities for strong efforts to achieve energy efficiency. These “performance-based regulation” (PBR) frameworks can reward any number of desired utility performance indicators, including lower sales per customer. It is also possible to combine a PBR mechanism with decoupling.[11]

Weather Normalization

Utility sales vary with weather and, for many, this is the single largest driver of month-to-month net income. A weather adjustment simply adjusts prices periodically, usually monthly, to address abnormal weather. These are relatively common for natural gas utilities.

Reserve Accounts

Some regulators, primarily municipal utility authorities, create specific reserve accounts to be drawn on when sales are below expected levels (or sometimes when expenses are above expected levels). These are quite common for hydroelectric-based utilities, where there are wet years and dry years and the power supply costs can vary dramatically.

All of these approaches leave the basic utility rate design unaffected. The total cost of service can still be reflected in an easy-to-understand volumetric price. The utility’s revenue is augmented when sales fall below expected levels. Other approaches are less desirable from an energy efficiency and customer impact perspective, but may also provide utility revenue stability.

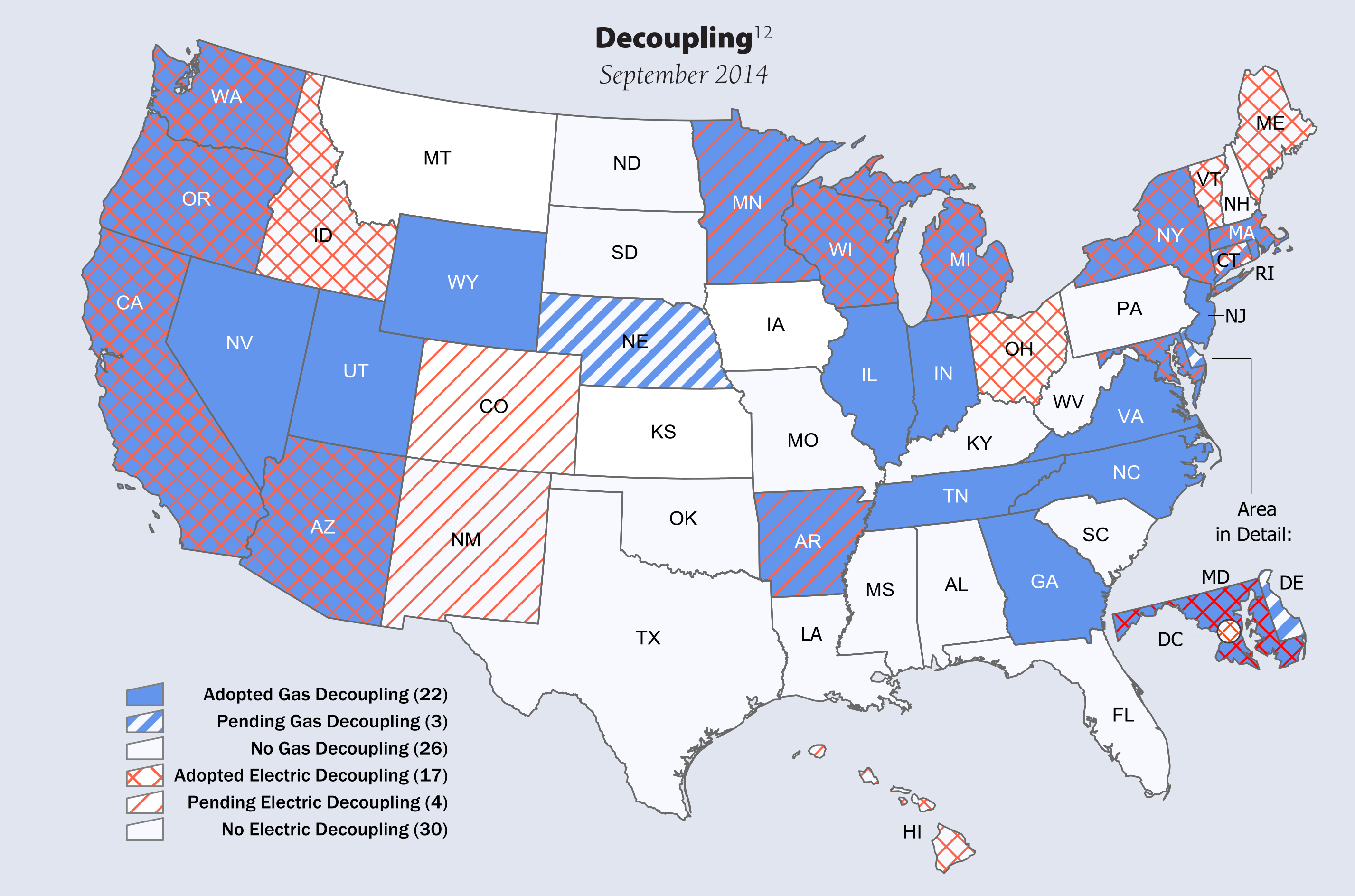
Demand Charges

Some utilities have proposed implementing demand charges on residential and small commercial consumers to recover a portion of revenues based on the customer’s highest hourly usage during a month. These types of rate designs are common for large commercial consumers. These are less appropriate for small users, because a customer’s highest hourly usage may be a poor predictor of their monthly or annual usage, or of the demand they place on the grid during peak hours and therefore the costs incurred to serve them. For example, an apartment dweller may have an electric water heater, coffee pot, hair dryer, and range all operating for a short period in the morning, creating a short-duration peak demand of 10 kilowatts, when their average consumption is less than 1

10 Presentation of W. Shirley, Arizona Corporation Commission, April 15, 2010.

11 See, for example, *Performance-Based Regulation for EU Distribution Utilities.* (2014). Montpelier, VT: The Regulatory Assistance Project. Available at: www.raponline.org/document/download/id/7332

Figure D-3



kilowatt. The utility gets the benefit of all of the units in that apartment building having diversity in their loads — meaning that all of the appliances are not running at the same time throughout the building.

Because apartments typically have lower demands than single-family homes, this rate form is less hostile to small users than a high fixed charge. But demand charges normally bill each customer based on their individual demand, not on their contribution at the time of the system peak, the circuit peak, the class peak, or even the peak of the customers sharing the same line transformer. In this way, they are inefficient rate forms. (See discussion of residential demand charges in Chapter IV.)

The only distribution system component that is sized to individual customer demands is the final line transformer; therefore, the only cost that can be justified to be included in a demand charge based on individual customer peaks is that of the transformer. The remainder of the system is sized based on the combined coincident demand of many customers on the circuit or the entire grid during extreme periods. While a demand charge based on the contribution of each customer to the system coincident peak demand would be one way to recover these costs, it would be poorly understood and could create highly volatile bills. A time-varying energy charge is a more easily understood way to achieve the same goal.

Connected Load Charges

Several utilities impose separate monthly fixed charges on customers of different size, often measured by the size of the electrical panel being served. This provides utilities with a stable amount of revenue each month to cover the cost of the grid connection, and also imposes higher charges on customers with larger potential usage. If the connected load charge is limited to the costs that are sized to individual customers — the line transformer and service

12 Source: Natural Resources Defense Council, http://www.nrdc.org/energy/decoupling/.

Table D-5

Manitoba Hydro Residential Electric Rate		
Standard Residential Tariff No. 2014-01		
Monthly Basic Charge:	NOT Exceeding 200 Amp	$7.28
	Exceeding 200 Amp	$14.56
Plus **Energy Charge:**		7.381c/kWh
Note: Minimum monthly bill is the basic charge		

drop — then it meets the first rate design criteria, that a customer should be able to connect to the grid for no more than the cost of connecting to the grid.

An example of this type of charge is the residential rate design of Manitoba Hydro in Canada. Their rate design is intended to capture customers with electric heat, who impose much higher capacity costs on the distribution transformers that serve them. Table D-5 shows the Manitoba Hydro rate.

Summary

This appendix has addressed the concept of high monthly fixed charges to recover electric utility distribution costs. This is a hotly contested rate design issue, and it is inevitable that different regulatory bodies will reach different conclusions. The key principles that we have sought to detail are:

- Customers should be able to connect to the grid for no more than the cost of connecting to the grid: Only very local distribution costs, such as the final line transformer and service drop, are "fixed costs" of individual customers connecting to the grid.
- Competitive industries do not impose fixed charges on customers, but instead bundle all costs into a per-unit cost; since one purpose of regulation is to impose on monopoly utilities the pricing discipline that the market imposes on competitive businesses, regulators should seek to minimize fixed charges in electricity tariffs.
- Other types of fixed charges, such as residential demand charges, are generally inappropriate, and should give way to time-differentiated energy charges.

The Regulatory Assistance Project (RAP)®
Beijing, China • Berlin, Germany • Brussels, Belgium • **Montpelier, Vermont USA** • New Delhi, India
50 State Street, Suite 3 • Montpelier, VT 05602 • *phone:* +1 802-223-8199 • *fax:* +1 802-223-8172
www.raponline.org