Will Retail Competition "Kill" IRP and DSM?

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This paper explores competition in the electric power market utilizing experience in integrated resource planning, energy efficiency, wholesale wheeling, and the development of tiered wholesale power rates in the Pacific Northwest.

Conventional wisdom is that competition will lead to the "de-integration" of utilities into generation, transmission, and distribution components. Much of the electric service in the western United States is already delivered to consumers by retail utilities that are not "integrated." In other words, some elements of the de-regulated utility already exist. Nevertheless, it is not clear how direct competition will reduce average rates in the face of the high costs associated with power transmission and distribution and growing power demands.

This paper describes a transitional retail energy service market designed to introduce meaningful price competition. This new market consists of two classes of power service: "standard service" consistent with current power supplies expected by consumers and required by regulators, and an "alternative service" market that is not bound by the historic "regulatory compact."

The standard service market described in this paper maintains consistency with the historic obligations utilities have for reliability, service, and equity. It allows ratepayers and stockholders to recover their investments in utility infrastructure. The alternative service market provides a variety of products and services with various levels of reliability and availability at competitive prices. The availability of substitute energy services in multiple power markets is expected to provide consumers with lower, more stable power prices.

Integrated resource plans (IRPs), corresponding to strategic business plans, would be needed to plan for and serve loads in the standard service market and optimize returns in both markets. The ability to trade in both markets should enhance the value of energy-efficiency services, fuel substitution programs, and intermittent renewable resources, both to utilities to enhance the value of their services and to consumers to limit uncertainties in price and reliability.

Introduction

After years of regulatory protection as a natural monopoly, electric utilities are being exposed to increasing competition, not only from other energy sources, but indirectly by other electricity suppliers including independent power producers (IPPs) and alternative providers of wholesale power. This trend began with the Public Utility Regulatory Policies Act (PURPA) of 1974, which required utilities to purchase power from local vendors (qualifying facilities or QFs) if the costs were comparable to the utilities' avoided costs for new generation. The trend accelerated with the deregulation of the gas industry and adoption of the wholesale wheeling provisions of the Energy Policy Act of 1992 (EPAct). These regulatory initiatives have created an environment that some observers believe points to deregulation of electric utilities and direct competition for retail consumer loads.

Conventional wisdom assumes "deregulation" will ultimately result in the separation of current integrated utilities into component parts and "open" or "direct" access to end-use consumers by multiple power vendors with retail competition for electrical energy services. Integrated utilities provide power to the majority of power consumers in the country. Most of these are stock companies owned by investors (e.g., Consolidated Edison). Most of these investor-owned utilities are regulated by state agencies that require integrated resource plans (IRPs) which give equal treatment to generation and demand-side management (DSM). There is concern that "de-integration" of utilities and retail competition will reduce the impact of IRPs and the role of both DSM. and environmental programs that have become common during the last decade. This is obviously a time of great change in the utility industry. During such times it is useful to review the past to see how it may shape the future. [1]

The Regulatory Compact

The electric power industry in this country is a product of the American industrial revolution. This legacy is reflected in bulk power generation and transmission technologies consisting of rotating machinery, transformers, and switch gears which are decidedly "low tech" by' today's standards. One characteristic of low-tech systems is that they rely on redundancy to ensure reliability. Investment in duplicate and oversized power system components is the result, due to the interconnected nature of electrical systems and the inability to effectively "store" the product (hold it in an inventory). The interdependency of power system components (generation, transmission and distribution [T&D], and end-uses) has resulted in standards for their design and operation that ensure a high degree of reliability. The high capital requirements and high fixed costs resulting from these standards provided the initial basis for limiting competition among electric companies in the early days of the industry. Limits on competition helped avoid further duplication of investments that would have increased costs even more, and also provided assurances to utility investors that their investments could be recouped.

The symbiotic exchange of unregulated profits for exclusive markets is known as the "regulatory compact" between utilities and their regulators. This compact consists of several goals. For regulators, these include providing affordable, reliable electric power to enhance the well-being of consumers and society. For utilities, the most important goals are the obligation to connect new customers and to serve new loads (load growth); maintenance of uniform reliability throughout the service area; and a general obligation to expand and maintain the utility system in a prudent manner.

Industry Structure

De-regulation and retail competition will likely undermine the regulatory compact. Although competition will quicken utility interest in prudence, reducing current utility franchise and earnings protections will also increase financial risks for utilities and affect their willingness to invest in new facilities to serve growing loads and maintain reliability. In order to understand the potential impacts of deregulation on power supply and quality and utility competitiveness, it is helpful to briefly review the underlying structure of the industry and its costs.

There are two major factors that generate power demand, use of power-using equipment by consumers and climatic factors that affect how often and how long those appliances and end uses must operate. These influences interact with one another to create limited periods when power demand peaks. Utilities plan for generation to meet these peaks. Doing so ensures that sufficient system capacity is available during non-peak periods. As a result, utilities have idle generating assets much of the time. This characteristic of utility features is graphically illustrated in a load duration curve. A load duration curve is a representation of the generation capacity required to meet hourly load requirements throughout the year (for 8,760 hours). Loads, and required generation, are on the vertical axis with hours along the horizontal axis. Loads are ranked from highest to lowest so that the maximum generation required is on the left axis and the minimum on the right axis (Figure 1). Ideally, utilities could buy just enough generation to cover loads each hour of the day. However, generating plants are not infinitely divisible. Further, utilities are required to provide reserve margins, typically 20% of hourly generating requirements, to meet unexpected peak loads or cover unplanned plant outages. The combination of indivisible, or "lumpy," resources and reserves leaves integrated utilities with significant idle generating capability (Figure 2).

Transmission and distribution system assets also exhibit characteristics that can be captured in load duration curves. T&D components are geographically fixed. Local loads can only be served by local facilities. As a result, these facilities are sized to meet local peak loads, which results in substantial investments in duplicative and oversized power system components. This effect is particularly evident in distribution systems where facilities may be built for loads that do not materialize or loads lost to the system because of economic or other reasons. Transmission and distribution system investments for reliability and growth currently represent about 60% of utility capital investments. Like peak generating facilities, these assets are underutilized much of the time (Figure 3). When the capacity and utilization for all of an integrated utility systems' components are viewed on the same scale, the amount of idle capital investment is staggering (Figure 4).

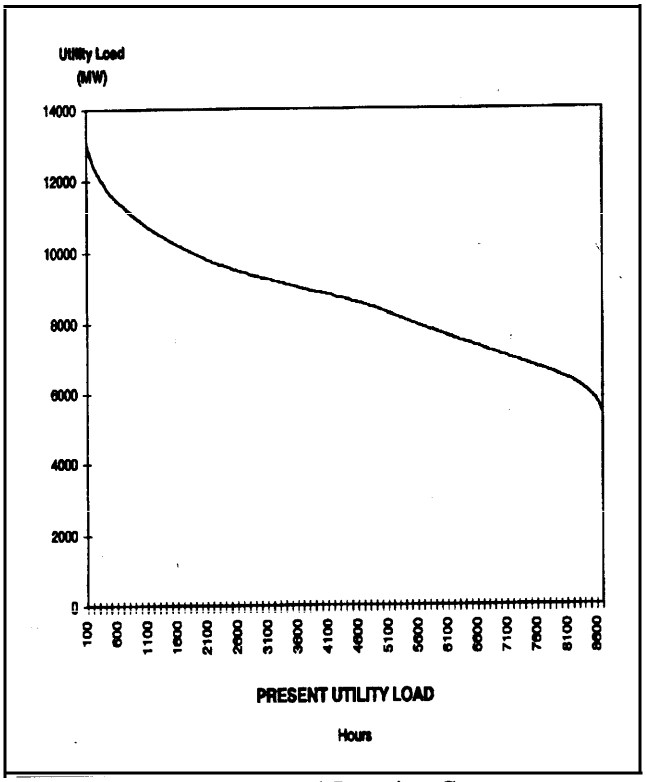

Figure 1. Load Duration Curve

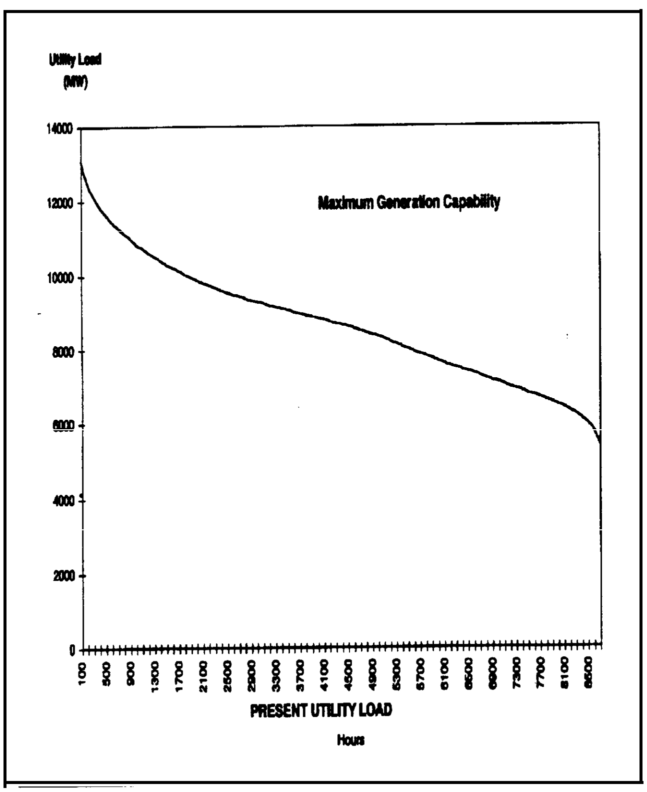

Figure 2. Load Duration Curve with Maximum Generation Capability

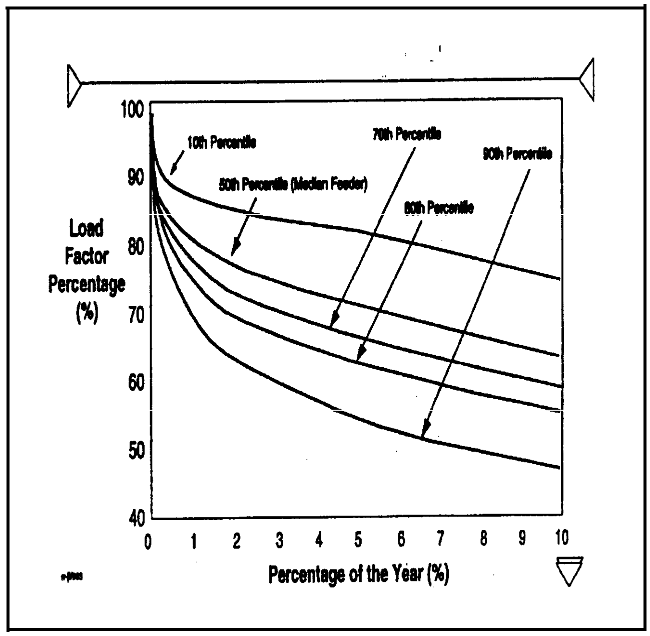

Figure 3. Feeder had Duration Estimates—First 10%

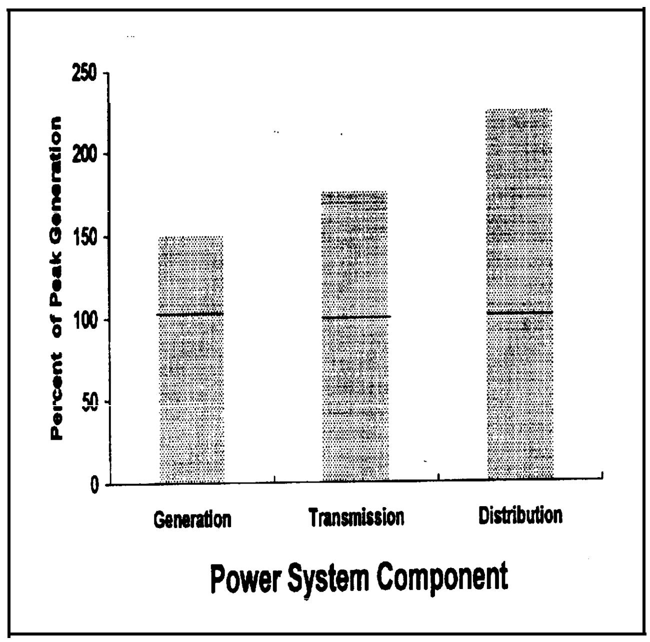

Figure 4. Maximum Capability and Utilization

Industry Pricing

The costs of service in an integrated utility environment consist of charges for power resources (generation, conservation, and T&D), fuel, operations and maintenance (O&M), and general and administrative (G&A) expenses. Regulators adopted cost of service-based pricing to ensure equitable rates to consumers from the utility monopoly. Typically, costs follow cause, with the cost of each component of the utility system being allocated to customers with similar characteristics (class-based rates) in proportion to the amount of the components the class as a whole uses. These costs are recovered in rates based on power use. As a result, capital investments, especially non-generating investments (i.e., in conservation, new T&D facilities, and environmental projects) increase rates. IPPs and co-generators are a competitive alternative power source for industrial customers primarily because on-site generation doesn't bear the utility's non-generating costs, which these customers see as the likely source of future price escalation.

Retail utility rates for industrial customers typically range from 10% to 15% above the average power costs of 3.5 cents per kilowatt hour. Average retail residential rates are about 8 cents (see Figure 5). This implies that the cost of direct service to these customers is about 4 cents. IPPs are quoting prices that range from the equivalent of 2.5 cents per kilowatt hour to the 3.5- to 4.5-cent range. The IPP rate is for power provided on site or to the transrnis-. sion grid. It generally does not include T&D wheeling costs or a charge for reserves to ensure reliability.

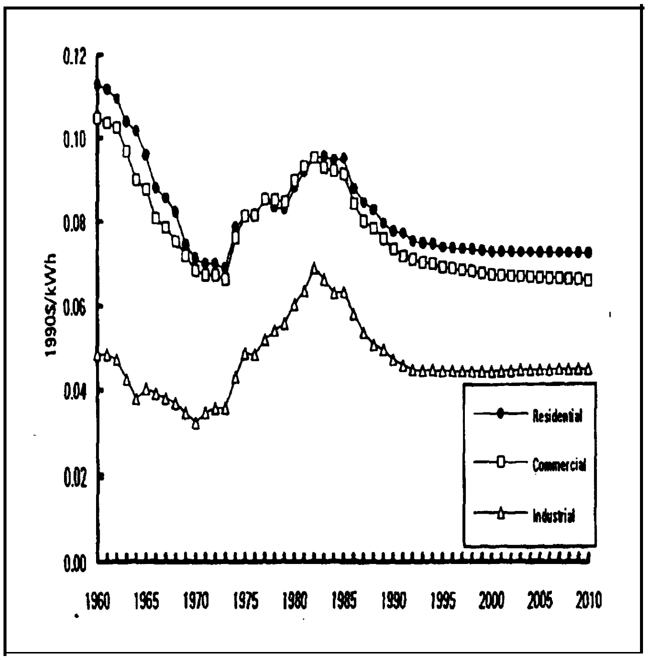

Figure 5. Trends in Electricity Prices (EPRI 1993)

The Coming Age of Direct Competition: Choice or Price?

Utilities have always had competition from other energy sources and from conservation. In many areas there is competition for wholesale power markets between utilities and non-utility generators. This competition continues, but with a twist. Today's competitors are trying to provide consumers with lower cost electrical energy services directly. Much of the debate over retail competition has focused on price. This is too simplistic. Interest in retail competition also has roots in a desire for choice: choice of vendors, choice of service options, and the ability to mix and match price and service. In this context, the environment for retail competition should provide consumers with a broad array of choices as well as preserving the option for consumers to continue to receive certain, reliable electrical energy services at stable rates. This is the issue that Bonneville faces with its retail utility customers and is proposing to resolve through tiered rates and "unbundled" products and services.

Precursors to Deregulation

Integrated utilities have three major components: power generation; bulk power transmission that links generation and load centers, and local distribution systems that provide power to each consumer (see Figure 6). The Bonneville Power Administration (Bonneville) is a federal power marketing agency responsible for transmitting and selling power in the Pacific Northwest from federally financed generation projects, primarily hydropower plants at federal darns. Bonneville is a power wholesaler. Except for several large industries, it has no retail customers. Instead, it sells power to over 100 utilities, principally publicly owned utilities, who directly serve retail consumers. These utilities include a mix of integrated utilities that have their own generating and transmission facilities, utilities that have some generation but no transmission, and utilities that only distribute power to end users. Together with these local utilities, Bonneville serves about one-half of the region's electrical loads. The other half is served by integrated private utilities, most of which rely on Bonneville transmission to serve some of their loads and, in turn, provide wheeling services to Bonneville to serve its customers. When viewed at a macro level, the Pacific Northwest can be seen as one example of how electric utility deregulation, with a mix of integrated and "de-integrated" utilities might work (see Figure 7).

Bonneville has been bound by legislation since 1980 to coordinate the development of regional power resources for its retail customers consistent with least-cost IRP objectives developed by a four-state regional power planning body, the Northwest Power Planning Council. Like integrated utilities that are bound by IRP regulations, Bonneville has followed a course that has relied on energy efficiency programs to meet new power demands in lieu of building new power plants. These investments have, in effect, substituted investments of capital in conservation for investments in power plants that would also have ongoing fuel and operating costs. This substitution of capital for expenses, and the opportunity costs of investments in conservation (lost revenues), produced rates that

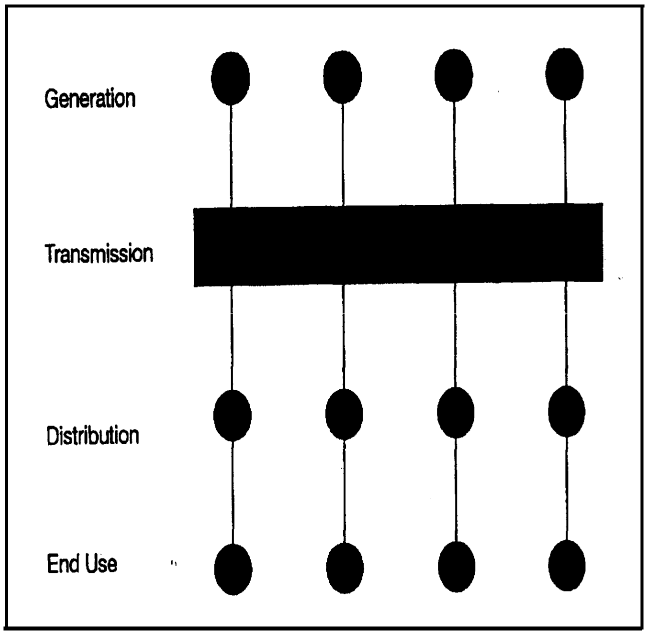

Figure 6. Integrated Utility Structure

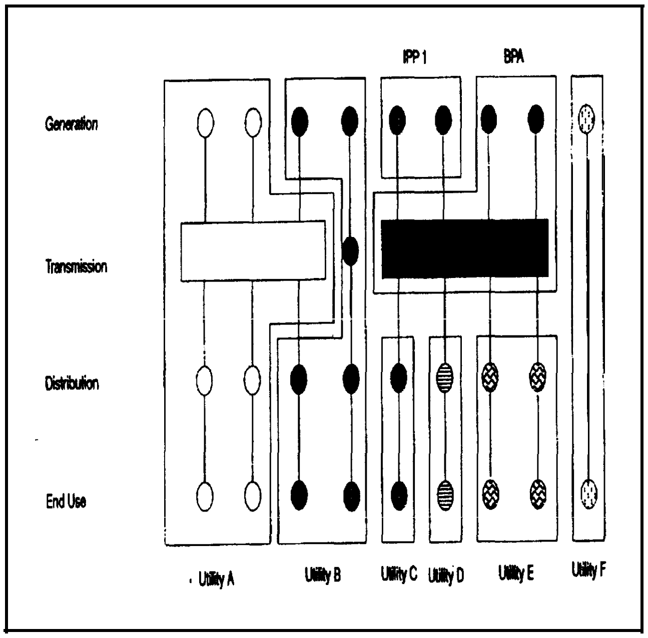

Figure 7. Utility Structure in Pacific Northwest

are higher in the near-term than they would be otherwise. The expectation is that these investments will lead to rates that will be lower, more stable, and more certain in the long-term and that environmental impacts will be less than those from comparable investments in generation.

Like utilities elsewhere, Bonneville's customers are comparing its rates to generation being offered by IPPs and others. In response to customer concerns about future rates, Bonneville has embarked on a wholesale reexamination of its policies and markets and is "reinventing" the way it does business. This led to a proposal to abandon its historic, average-cost-based rates in favor of "tiered" rates, consisting of a low-cost base pool, a second tier with price based on marginal costs, and a variety of unbundled products which are largely "market" priced. Second-tier rates provide a more accurate price signal for load growth. Tiered rates and unbundled products and services complement each other and are part of a total solution, rather than discrete parts. Although the details of this proposal are specific to Bonneville and its unique role in the Pacific Northwest wholesale power market, the concept and the quasi-deregulated power markets in the region provide insights into how the transition to a deregulated, fully competitive utility environment could be managed in other parts of the country while retaining the benefits of IRP and DSM.

Bonneville's Tiered Rates and Unbundled Services Concept

Bonneville plans to meet the loads of all of its retail utility customers, only some of which are growing. By "regionalizing" growth, rate increases are reduced for growing customers and DSM can be acquired from all of its customers, including those that are not growing. However, this results in rate increases for utilities that are not growing, which are compounded by revenues lost due to energy conservation programs. Tiered rates were proposed as a mechanism to insulate utilities that were not growing from growth-driven rate increases and to more accurately reflect the real cost of growth for utilities.

At this writing, this proposal is still being refined, both internally and with Bonneville customers. The following discussion is the authors' interpretation of how the concept could be implemented. Two pools of power would be created, each with its own pricing strategy. The first of these, "Tier 1," would include most of the existing, embedded generating resources and would serve a large fraction of Bonneville's generation obligations tied to an historic "base" period. In our illustration, Tier 1 consists of resources sufficient to meet 85% of Bonneville's customers power purchases in some base period, say 1992 (see Figure 8a). The Tier 1 generating pool is fixed in size, and power is priced at average embedded cost. These costs are relatively low. The "second tier" of power services is comprised of an array of products and services that make up the difference between Tier 1 resources and total power requirements of Bonneville's customers. This includes the 15% of the energy "missing" from the Tier 1 allocation, load growth services, and load following and shaping services (see Figure 8a.). Tier 2 power would be priced competitively (with IPPs) and will trend toward marginal costs as demand grows and new resources are added. Along with tiered pricing, Bonneville proposes to "unbundle" its formerly homogeneous power products into discrete component services and to supplement these with new services including DSM, brokering, and planning support. The resources acquired to meet load growth after 1992, and their costs, are included in the Tier 2 pool (see Figure 8b). Utilities with shrinking loads, from economic downturns or conservation, will need fewer resources from the Tier 2 pool and can insulate themselves from growth-driven rate increases by reducing Tier 2 purchases (see Figure 8c).

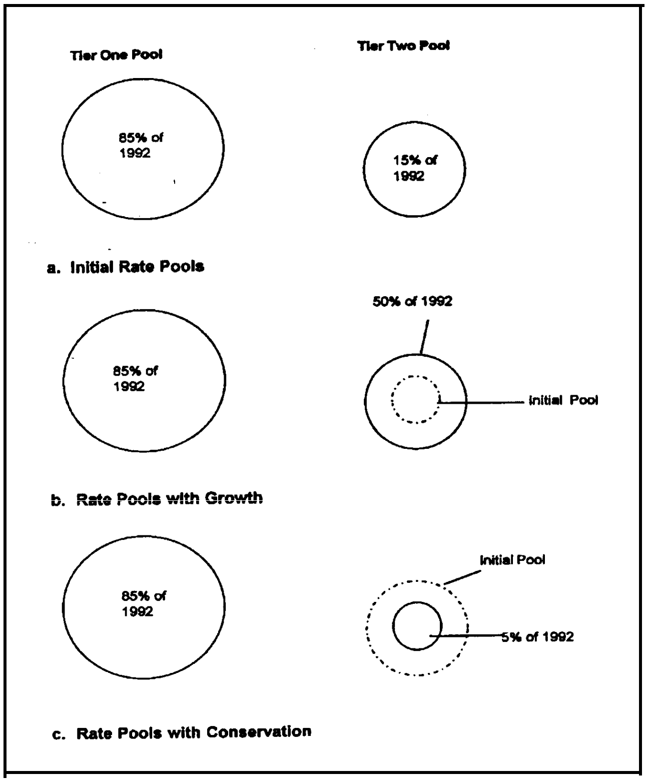

Figure 8. Tiered Kate Cases lllustrated

At first blush, tiered rates appear to be simply a strategy for Bonneville to reallocate its costs to retain market share among price-sensitive wholesale power customers. However, aggressive pricing of new power by IPPs and new wholesale power products by local integrated utilities would undermine a simple cost allocation strategy by Bonneville. Further, Bonneville and the region have been in the forefront of the movement toward open wholesale wheeling, which would also undermine such a simple strategy. Instead, Bonneville's tiered rates strategy anticipates erosion of market share in its traditional markets and expects open access to expand its market reach and open markets for new, unbundled products and services. In other words, tiered rates and unbundling is partly an attempt by Bonneville to define terms of competition by establishing, in advance, the tools it intends to use to compete. It recognizes the role of price in competitive power markets and the strategic role unbundling can play in the emerging market for "energy services." The transition to a competitive energy services market recognizes that traditional utility concerns about reliability will shift from the power system to consumers with rates and terms of service reflecting varied reliabilities (interruptible rates, for example). Bonneville's unbundled products and services anticipate the need for flexibility in energy services so that customers can optimize their energy budgets through purchases from multiple vendors. Providing a broad range of services not only facilitates this transition but also ensures a Bonneville share in this emerging market.

The new structure creates a situation where Bonneville is able to offer power services, Tier 1, without load growth risk at rates that are directly comparable to competitors in both terms and cost. Pricing of services in this market is driven by two factors. First, product standards are set: the allocation of resources to the pool and the customer-specific entitlement to access that pool do that. Second, the presence of competitors capable of selling identical products (with wholesale wheeling) establishes market-based price caps. It also creates a new market for services that may have been taken for granted by Bonneville customers; transmission, reserves, peak capacity, daily and seasonal power exchanges, and so on. The allocation of resources to two pools on the basis of historic loads creates an immediate demand for additional services from Bonneville or other vendors because current loads cannot be met from just the Tier 1 pool. This should lead to the creation of a range of new products and services, which will provide customers with choice. It is expected that demand for these services will attract competitors based on the higher price and value of these services. This should create a competitive market for these services where their economic value can be more accurately set.

The presence of active markets for power resources which must be used together to satisfy current and future power demand creates an environment where the pools compete against each other. Because the price of Tier 1 power is capped and the resources are fully allocated, this inter-pool competition could include the following:

- "expanding" Tier 1 capabilities through investments in conservation that "free up" Tier 1 allocations
- investments in load shaping, demand-side measures that can be combined with other Tier 2 products, which may not meet standard reliability criteria, to create a new "bundled" product that looks like reliable power
- innovative retail pricing by retail utilities, which reduces demand for Tier 2 (e.g., inverted rates) or

shifts demand to lower-cost Tier 2, unbundled products from Tier 1 (e.g., interruptible rates)

- strategic investments in, or purchases of, generation (including intermittent renewable and storage) that can be used to arbitrage between the two pools, or in Bonneville's case, to firm its usually abundant, but increasingly inflexible, secondary hydro power. .

Many other outcomes are possible, including fuel-substitution, fuel-switching, local generation and storage, and so on. One of the strengths of open markets is that they unleash creativity; the risk is that they do so in ways that are difficult to forecast.

Lessons for Retail Competition

Retail competition is being proposed to respond to the same issues Bonneville responded to with tiered rates and unbundled service. Although the success of their approach remains unknown, it contains elements that should become part of both the debate over retail wheeling and any transitional environment along the path to industry deregulation.

The heart of Bonneville's new approach to the market is the allocation of existing resources and current costs into categories of utility service. The first tier provides continuity with Bonneville's historical obligation to the region to provide low-cost power. This has a corollary in the retail power market, where there needs to be recognition of historic utility obligations under the regulatory compact. Although Bonneville acknowledges that these historic obligations will continue to be honored, they are indicating this obligation is limited. The benefits of lower prices and alternative power services derive from Tier 2 and unbundled services. These benefits come from innovative new ways of providing service that may be previously "bundled" services provided a la carte and new services that do not carry the obligations of the regulatory compact (i.e., infinite amount, universally available, highly reliable, stable prices, etc.). A market for some of these products is assured because the limit on first tier products is less than current demand (15% in our example).

Bonneville's proposed market structure provides a framework for competition, However, it has been injected into a wholesale power environment where likely competitors and their business motives and practices are known. Historic wheeling transactions and current regional transmission group activities have addressed many of the first order concerns about how to execute power transactions among multiple parties while maintaining the integrity of the power system. This is not likely to be the case in other regions and these same motives may not apply to parties interested in retail wheeling, particularly speculators and those interested in discount services with less than utility standard reliability. Translating Bonneville's new wholesale marketing approach to retail competition will require specific attention to mechanisms to ensure the long-term reliability of the power system.

A Retail Competition Scenario

Key features about retail power market structure can be gleaned from Bonneville's tiered rates proposal. One major difference between Bonneville's situation and retail competition is that as a wholesaler, Bonneville does not have, and has not had, a monopoly on generation. There have always been other ways Bonneville's customers could obtain similar services. By creating two different energy service markets, Bonneville expands the range of options its customers have without foreclosing any options to obtain "old style" services from other vendors. This is not necessarily the case in retail competition where both markets and utilities are "transformed." The attractiveness of self-service has already enabled many large utility customers to renegotiate the terms of their service, usually at the expense of other customer classes.

The challenge in creating an effective model for retail competition is how to ensure sufficient alternatives are available to both utilities and consumers who want to retain their option to continue to receive expected levels of "old style" power services without either overburdening new vendors or giving the local utility an unfair competitive advantage. The key then is to create an environment in which multiple producers can compete for retail consumers with products that are substitutes rather than direct competitors.

One way to explore this possibility is to construct a possible scenario for retail competition. This approach has the advantage of creating an intellectual model that can be compared to the current command and control regulatory process. If the specific model survives this review, it lends support to arguments that retail competition can be implemented and may be advantageous. However, this approach has the disadvantage of potentially diverting attention from the issues to the model itself. Further, if the specific model described is not perfect, there is a tendency to reject the argument it was used to illustrate in toto. At this stage in the retail competition debate, the model or models used for pedagogic purposes are unlikely to resemble those that finally emerge. Our readers are advised to keep that in mind as we present one possible scenario.

Our illustrative retail competition scenario consists of two (or more) retail energy service markets that co-exist: a

"Standard Service" market similar to current regulated retail power markets and an "Alternative Service" market.

The Standard Service Market

The Standard Service energy market retains continuity with historic expectations for utility service (i.e., honors the regulatory compact). This markets remains regulated. Initially prices are regulated, or at least capped, although the focus shifts to price management through regulation of market size, access, and service standards. Revenue requirements are assigned to the Standard Service market to ensure repayment of investments made to provide historic utility service levels (i.e., pay the mortgage on the regulatory compact). Like Bonneville's Tier 1 resource pool, the Standard Service market is constrained to a fraction of its maximum capacity, either through rates, or through allowing artificial limits of some amount, say 85% to 90% of peak loads and associated load factors. Competition for Standard Service retail customers is ensured through a temporary limit on market share for the current retail utility. (However, the retail utility is free to compete in the Standard Service market of other utilities and vice versa.)

The Standard Service market would be open to anyone who could meet service standards. These "standards" would be subject to regulatory oversight, monitoring, and enforcement. To maintain consistency with the regulatory compact, the standards we envision for standard service loads include

- reliability
- reserve requirements
- obligations to connect all new customers (including Alternative Service customers)
- obligations to serve the growth of Standard Service loads
- price stability.

Although market share for new entrants may be limited initially, this limit would be relaxed as soon as the transition to the new dual market for electricity services was fully functioning. Maintenance of current price levels initially will make the Standard Service market a high-value market for sellers with wholesale power costs lower than the local utility, attracting new entrants and eventually leading to competitive price reductions without sacrificing service standards. The initial market cap also stimulates demand for Alternative Service products and maintains the initial value of Standard Service products to consumers through scarcity. This ensures price stability for consumers and vendors as well as revenues for lenders and stockholders. Mechanisms will be provided for new entrants to co-own or purchase some or all of the current utility T&D facilities. (This subject is currently being addressed for transmission facilities during the formation of regional transmission groups, under EPAct.) As this market matures, this threat is expected to be sufficient to keep wheeling charges competitive with less and less price regulation.

New capital investments in T&D facilities to provide Standard Services to new and growing customers are one of the principal drivers behind current rate increases. Rates for "growth services" could be priced at marginal costs in our scenario. This could reduce the historic pattern of over-investment in T&D and resulting idle capacity (see Figure 4). It may also force a departure from current class-based treatment of rates toward one that more accurately reflects technical and geographic differences in providing power services. These potential "adders" to Standard Service rates should depress demand for expansion of "business as usual" electrical service and stimulate demand for Alternative Market products including small-scale generation, DSM, and energy storage. Planning for the new Standard Service power system will require an IRP for strategic planning. This plan would be necessary for each Standard Service vendor who wanted to expand service, both so they could match their markets and resource and to document the need for new facilities for the public and siting agencies. This plan would also require an examination of T&D needs and alternatives including local generation, DSM, and storage (i.e., distributed utility resources).

This scenario also includes Standard Service market entry and exit conditions. These include certification that new entrants are technically and financially able to fulfill service standards and provisions for exit that do not expose the system to excessive risk. Due to the interdependency of all aspects of integrated electrical systems, these standards go beyond the traditional financial guarantees and performance bonds to include control over generation reserves and T&D facilities required to maintain Standard Service levels. (This is consistent with today's power pool and coordination agreement.)

The Alternative Service Market

The second retail energy market is an Alternative Service market, which may in fact, consist of several markets that provide energy services without regulatory constraints on price, reliability, service obligations, and so on. These products would include full disclosure of product terms and conditions. However, the consumers of these products, not the power system or Standard Service customers, would absorb any price and performance risks.

The success of this market is in the trade-off between lower energy service costs and product risks. The Alternative Service market would be assured through wholesale and retail access at rates commensurate with the terms and conditions of service. In other words, products using T&D capacity not required for a Standard Service transaction could be wheeled at a comparatively low rate because they are using otherwise idle capacity. .

Formal participation in this market would only be required for vendors requiring access to T&D facilities and/or consumer "gateways." (Gateways are expected to replace today's power meters because the need to control and monitor power flows by vendor and service level will require additional capabilities.) Entry and exit requirements would also be imposed in this market, primarily to ensure accurate information about market conditions and access to facilitate market transactions. Demand for Alternative Service products would be assured because of the constraint on Standard Services (market pull). In addition, the limit on market share for the local retail utility would stimulate it to offer new products through this market to absorb spare capacity and generate new sources of revenues (market push).

Market Interactions

One of the strengths of the "two-market" model is that it allows currently idle generation and T&D facilities to be more fully utilized without requiring new investments. As is the case with Bonneville's tiered rates, this could take many forms. However, Bonneville's tiered rates target retail utilities who retain the obligation to serve load growth. These retail utilities do not currently have the freedom to simply ration power to consumers or provide less reliable power supplies. This scenario for retail competition described above provides that freedom to consumers and retail energy service providers. How individual consumers choose products from the two markets is up to them. Although an IRP may not be publicly required of Alternative Service vendors, they would need an IRP-like plan for their own marketing and planning purposes.

Similarly, the constraints in our scenario on Standard Services (both technical and price induced) will stimulate investments which can be used to expand the effective pool of Standard Service resources. For example, conservation could be used to free up power or T&D capacity for resale to meet growth in the Standard Service market. (The kilowatt saved and the kilowatt served with conservation effectively equal two kilowatts of Standard Service resources.) Further, the higher values to be found in this market will lead to investments that leverage Alternative Service products to compete with Standard Services. Energy storage devices, dual-fuel devices, or direct load control could be used to take advantage of "spare" system capacity in the Alternative Service market to provide nearly 100% reliable power for a discount over Standard Service rates. Similarly, strategically located generators, even small-scale generators or solar cells, could be used to generate power only during T&D peak load periods which could be supplemented with low-cost power produced from spare system capacity to provide assured generation to customers who don't have loads coincidental with generating or T&D system peaks (the distributed utilities concept). These trade-offs are similar to the process IRPs use to integrate demand and supply-side resources.

To the extent that consumers themselves want to engage in these trade-offs, manufacturers may be induced to provide this capability in their products. For example, appliances could be designed with timers (like programmable thermostats) that could schedule energy-intensive functions for specific time periods (i.e., off peak water heating, clothes washing, refrigeration, and so on). These controls could be designed to be integrated into "smart house" wiring or customer "gateway" programs that schedule these end uses to coincide with power supplied by intermittent generation from solar and wind power from "green power" vendors.

As more "intelligence" is built into the power system, the utility industry will evolve from its electro-mechanical roots toward a "high tech" future where technical innovation leads to an increasing array of new power products and higher levels of system efficiency. This is likely to lead to growth in energy services being absorbed by the Alternative Service market rather than expansions in the Standard Service market and associated conventional generation and T&D facilities.

Environmental Impacts

The viability of this, and many other, scenarios for retail competition rests on the assumption that more power is likely to be flowing through the system than before due to lower prices. This presents a risk to the environment. We have not ignored this risk. Instead, we see the two-market approach as a key to minimizing future environmental risks because it is founded on a constraint on Standard Service power supplies and true marginal cost pricing for expansion of those supplies. This, coupled with regulatory oversight of this market and IRP-type approaches to expansion planning, should provide appropriate environmental cues to guide power resource development. In addition, assuming competitive products, the greatest remaining uncertainty consumers face for energy costs will be fuel costs and availability and the costs of environmental regulations outside traditional utility regulation.

There are two major ways for producers or consumers to limit these risks. The first is to select a supplier with a diversified fuel mix or to purchase supplies from a variety of single fuel producers. The second approach is for power producers to build their generating portfolio around renewable resources. These may require the construction of some conventional generation for back-up service, but this investment can be limited through contracts with other generators for "spare" capacity. This would result in. a mix of resources that would be much less sensitive to changes in fuel prices, supplies, and environmental restrictions. The ability to sell power from this kind of a resource base on the basis of long-term price and supply stability could create a growing market for "green power." This latter approach reinforces the benefits of IRP-like planning.

Conclusions

Although open power markets may offer advantages over current command and control regulation, the transition to open markets represents a major change in public policy. The legacy of regulation and associated utility engineering practices has created power supply and reliability expectations among consumers, regulators, and policy makers that will need to be addressed during both the debate over retail competition and the design of new power supply environments. This paper reviewed features of Bonneville Power's new wholesale power supply proposals and identified elements that can be used to guide the development of a new retail energy service marketplace. A model retail energy service marketplace was developed using these elements and it offers one approach to address the competing goals of regulation and competition using a combination of regulated and "free" energy service markets. The approach described recognizes social interests that will continue to be addressed through IRP-like planning. It also introduces competitive forces that recommend the development of IRPs for most competitors and provides roles for DSM and renewable as strategic tools for some power marketers.

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Endnotes

1. The electric utility industry does a generally poor job of communicating with the public, especially about how it plans for and operates the power system. As a result, what may be common knowledge to people who work closely with the industry may be unknown to people with limited exposure to utility operations.

   Good overviews of industry history, regulatory role, and current conditions can be found in "Restructuring of the Electric Utility Industry," Document 94-4 by the Northwest Power Planning Council and "California's Electric Services Industry: Perspectives on the Past, Strategies for the Future," by J. Dasovich, W. Meyer, and V. A. Coe, published by the California Public Utilities Commission, San Francisco, 1993.

   Two complementary papers dealing with issues in retail wheeling and possible outcomes are "Competition, Coordination, and Compliance," by Stephen R. Connors (Proceedings of the NARUC-DOE 5th National Conference on IRP) and Stephen Wiel's presentation on this panel.

Reference

Electric Power Research Institute (EPRI). 1993. *Drivers of Electricity Growth and the Role of Utility Demand-Side Management.* EPRI TR-10263, Prepared by Regional Economic Research, Inc. and Barakat and Chamberlain, Inc. for the Electric Power Research Institute, Palo Alto, California.