
User-Ownership of Electric Transmission Grids

Toward Resolving the Access Issue

Douglas A. Houston

The battle over the role of competition in the electric power industry now centers on conditions of access to the transmission systems through which power is moved from generation plants to consumers. Many utilities are willing to cede some control over their transmission assets as the price they must pay to take the next steps toward power marketing. To many industry observers, however, utility-controlled transmission forms a seemingly impenetrable barrier to competition, and therefore either the control or the direct ownership of transmission must be fully wrenched from the utilities. Otherwise, they argue, the utilities will rig access conditions so that newcomers always are at a disadvantage. Transmission is seen as a gatekeeper. It can be closed in defense of the regulated marketplace or opened to support a greater number of participants.

As sellers and buyers increasingly attempt to break through this transmission gateway, utilities argue in response that any policy that legally forces them to yield access to outsiders is potentially damaging to services for current users of the system.

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The current transmission networks in the United States were designed for substantially independent utilities; those lines may not support extensive trading without impairing quality. To date, U.S. regulators have approached the issues of market competition and transmission access with caution and have dealt with the conflicts between regulation and competition in a piecemeal fashion. No broad policy changes have been made at either the state or the federal level. Modifications are derived instead from other actions, such as merger approvals. Because those case settlements do not set precedents, they leave an outsider's status uncertain. Because most exchanges of power are long-term commitments between buyers and sellers, the transmission uncertainty increases transaction risk and dampens the development of power markets.

The proposal that I present to reform transmission policy requires that private property rights to the transmission assets be redefined in such a way that the incentives of owners are consistent with maximizing the value of the transmission system. Instead of wheeling or common carriage, I advocate user-ownership of regional transmission systems because it offers two benefits. First, widespread user-ownership of transmission networks can eliminate much of the monopolization risks without recourse to

direct regulation. Second, users-as-owners can be provided with incentives to build and operate efficient organizations, with universal rules for ongoing adjustments to ownership, assets, and activities. While common carriage and wheeling might provide the first benefit, they do not provide the latter well.

User-owned transmission systems would increase the services offered as well as the area served. Such systems would become, in effect, regional networks. Entry would be possible, either by acquiring existing units of capacity or by making incremental system investments. Thus, barriers to entry might be lowered. Such systems will require that the transmission assets held by public utilities and other public enterprises be spun off from their other activities to form separate, user-owned and operated regional firms. Unlike in the AT&T breakup, the new transmission firms would be aggregated from many utilities' holdings.

Purposes, Properties, and Institutional Aspects of Transmission

To understand what might be feasible with respect to public policy in transmission of electric power, it is useful to examine transmission's historical purposes, technical properties, and legal and institutional features, including recent initiatives that are changing the industry.

Purposes of Transmission Systems. Utility transmission systems provide the paths moving power from generation plants to the substations controlling access to the final consumers. In 1988 approximately 620,000 circuit miles of transmission lines existed in the United States; those lines span a range of voltages from 22 to 800 kilovolts. The consumers at one end of transmission make up a load center—a distribution territory established by the utility, a city-owned or cooperative system, or an industrial operation. Utilities have historically built transmission lines for their captive accounts under the assumption that their exclusive geographical markets would remain intact. Traditionally, each utility has produced the vast majority of the power used by its own accounts. Thus, the existing configuration of transmission lines and generation plants reflects the historical intent to make each producer a full-service, vertically integrated provider to the consumers in its franchise territory.

The transmission lines of utilities also are interconnected with surrounding utilities. That permits

some selling of power, sharing of reserves, and emergency support among participants. Most of those functions are performed within power pools—constellations of utilities by region. Those coordinating efforts are administratively broken out into nine reliability councils forming the North American Electric Reliability Council. Power pools are an important means of sharing within the industry, but the coordination within the pools is typically limited. Historically, pools have not been a means of sharing generation capacity obligations. Utilities instead have applied pooling transactions more commonly to supplement, balance, and provide security.

Power pools were not designed for widespread power “shopping,” nor are all regulators ready to encourage that behavior by utilities—and certainly not by resellers or consumers. But shopping can make economic sense. Consider a utility that has strained capacity and, because of local conditions, has few options for building a cost-effective new plant within its territory. A distant producer may be willing to build and contract for new capacity at a lower cost than could the utility within its own territory. Power trading could be expanded to include other players such as retail accounts (distributors and municipalities), industrial consumers, independent power producers, and cogenerators.

Wholesale capacity and energy purchases will place significant stress on transmission systems. Yet, utilities have expanded their transmission capacities with little planning for broader transmission demands that marketing of electricity would

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stimulate. At best, today's transmission conditions reflect a transition to more integrated grids. At worst, the existing conditions can be used as a continuing barrier to further power marketing. Thus, establishing policies that facilitate the efficient development of transmission in a competitive marketing environment is crucial. This assumes that the nature of that competition can be clarified. To date, the Federal Energy Regulatory Commission (FERC) has not

established an industrywide policy with respect to competition and transmission access and has instead taken cautious steps, constrained by its concerns for the effects on current participants.

Power pools demonstrate attractive gains from voluntary coordination. Utilities could gain greater value from more extensive relations. Yet, although long encouraged to do more, utilities have been hesitant to take such steps as centralizing dispatch—operating multiple utilities' generating capacity according to the marginal cost of power. It is difficult to provide a compelling technological argument for the limited transactions within pools and among the pools themselves. Utilities argue, however, that voluntary wheeling among utilities requires careful planning and coordination. Without appropriate physical and institutional protection, they claim, wheeling-on-demand for outsiders can disrupt the entire system of power delivery. Reliability would suffer, costs would increase, and franchised con-

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sumers would pay more for basic services. If the problem of access is defined in the context of utilities with unchangeable, legal obligations to their franchised consumers, then wheeling problems appear to present a continuing confrontation between the "haves" and the "have-nots."

Physical Functions of Transmission. Transmission networks are unlike switched networks such as telephones, where messages can be diverted from one path to another. Electricity networks also are unlike pipelines, canals, or highways, where gas, boats, or vehicles travel sequentially along a path. When a generating station delivers power to an electrical network, physically identifying its contribution is a hopeless task because all electricity intermingles in the network. The physical properties of electricity networks suggest that different design and operational approaches from those applied to transport must be used. The loss of an electrical transmission line means that all other lines instan-

taneously must be capable of carrying the increased power flows. Thus, just as generation reserve margins are necessary, so too are transmission line reserve margins.

When separate utilities wish to transfer electricity, the transmission interconnection is made across control areas that meter and regulate the flows according to agreements among utilities. Most of the flow control is managed by changing supply—the importer reduces supply and the exporter increases it. The case of power exchange from a generator to a consumer across a third party's transmission lines is a classic case of wheeling. Here, all three parties must actively monitor and control the flows. Such activities are not only feasible but frequently accomplished; the tasks are eased today owing to advances in telemetering and computer operations. Increased transmission cooperation among utilities can reduce the costs and risks associated with greater exchange. Indeed, a few large holding companies, such as American Electric Power, and "tight" pools, such as the New England Power Pool, engage in complex and subtle shifting of loads among numerous generation plants; units are ordered on line according to cost characteristics.

Unfortunately, when two utilities engage in trade, power flows often invade systems that were not intended to receive it. This "loop flow" problem complicates the effort to simplify market relationships. The costs borne by others as a result of those unwanted flows can be significant, according to the industry. For example, a utility that continually is hit by loop flows may have to reduce its own use of the lines and eventually have to expand transmission capacity. On the other hand, the problem has not lead utilities to develop pricing mechanisms to reflect the cost externalities; instead, it is generally assumed that those costs even out over time among trading utilities.

In sum, electric power networks are complex in ways that demand consideration of the entire network operation when a single transaction is explored. Unexpected and unplanned uses can cause damage to others.

Legal Status of Transmission Access. Transmission access is significantly restrained by law and regulatory treatment. Most questions of access to transmission systems today fall within the jurisdiction of FERC. Acting under the authority of the Federal Power Act of 1935 to regulate wholesale power transactions in interstate commerce, and with an extended reach of this authority resulting from Supreme Court rulings, FERC has become the primary arbiter

over wheeling transactions. To date, the access issue is frequently simplified to a question of mandatory wheeling—legally requiring one utility to transport the electricity of two or more other parties.

The authority of FERC to compel any utility to wheel power for another party is quite limited. The general view that it cannot do much—even in response to anticompetitive or discriminatory behavior by a utility—is based on several Supreme Court and lower court cases. The leading case was *Otter Tail Power Co. v. U.S.*, in which the Court concluded that Congress did not intend for independent commissions to order wheeling.

Wheeling has sometimes been gained by appeal to the Atomic Energy Act of 1954, which requires that the Nuclear Regulatory Commission (NRC) review the antitrust implications of a utility's building and operating a nuclear plant. On occasion, the NRC has imposed wheeling obligations. Generally, the licensing conditions placed on an applicant appear to have been targeted at improving supply conditions for small municipal and cooperative power systems. The opportunity to use NRC reviews for any purpose, however, is moot because of the halt of nuclear plant construction in the United States.

In recent cases FERC has shown a greater willingness to consider mandating wheeling when utilities are requesting favorable treatment on mergers and trade. An important application is the PacifiCorp merger in 1988. The ability of PacifiCorp to merge with another utility, Utah Power and Light, was conditioned upon the merged firm's allowing wholesale transmission access to lessen the likely anticompetitive effects of the merger. PacifiCorp accepted those terms. FERC was careful, however, not to make that case a precedent for future mergers: "[A] requirement that it wheel power for competitors in order to ameliorate the likely anticompetitive effects of the merger would not serve to make the merged company a common carrier. Thus, the Commission is not doing indirectly [making the merged company a common carrier] what it is prohibited from doing directly."

State Actions on Transmission Access. Recently, states have become more active in the transmission access and wheeling debates. Those actions, surprisingly, have been in areas previously considered federal domain. States have had jurisdiction over most certification and citing of transmission lines, while FERC has exercised jurisdiction over the interstate transmission of electricity. Supreme Court rulings seemingly have provided authority to FERC

in pricing unbundled transmission services, but, because the revenue requirements are typically recovered by retail pricing, the state can exercise some control.

States are challenging the assertion of exclusive federal authority by making transmission certifica-

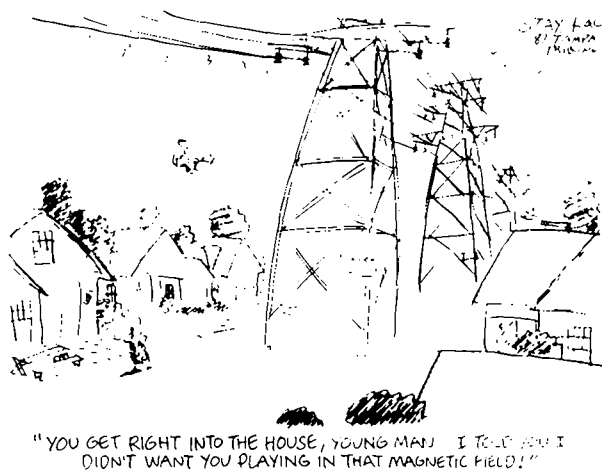
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tion conditional on a utility's providing transmission access. It seems probable that the increased claims of state authorities are linked to the growth of the wholesale market in power, in which both independent producers and consumers play a larger role. For example, in Florida the public service commission sought to establish a statewide rate for the transmission of qualifying facility power and to order the wheeling of qualifying facility power. FERC denied both requests; FERC argued that the actions by the state commission would overstep its limited authority.

Perhaps the first major test of the boundaries between state and federal jurisdiction over transmission will be resolved in a Wisconsin case. In 1989 the Wisconsin Public Service Commission set out guidelines for least-cost planning. The commission asserted that efficient design and operation of the statewide electric transmission network formed an indispensable component of such a plan. Therefore, it directed utilities to develop and implement a comprehensive system of multiple transmission cost- and use-sharing agreements.

That order declared that control of the transmission system is necessary if the state is to control capacity planning and development of least-cost options. The decision was appealed to the state circuit court. Unlike in the Florida case, the Wisconsin commission's order is grounded on a state statute that authorizes the state commission to engage in supply planning. Wisconsin's actions could easily be mimicked by other states.

One reason for the growing state challenges to federal regulation is that FERC has not formulated definitive policy on issues of competition among industry participants, especially transmission access.



FERC claims that it does not have sufficient authority to do so. Because state commissions are legally responsible for the supply systems within their states, and because those relationships are increasingly dependent on wholesale contracts with new players (qualifying facilities and independent power producers), state regulators are likely to continue pursuing the issues surrounding transmission access. Tensions between state and federal regulators will grow until the issues of transmission access are resolved among the regulators themselves, in the courts, or by congressional action.

Voluntary Wheeling and Transmission-Sharing Agreements. Increasingly, utilities have been willing to legally bind themselves to providing transmission access as a means of reaching other goals. The leading edge of that effort may be Public Service Company of Indiana's quest for greater marketing flexibility. To achieve it, the company

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negotiated to open its transmission lines to all companies that will provide similar openness. The company's initiative appears quite reasonable: it had excess capacity and neighboring utilities had shortages. All parties could gain from opening up transmission. A 1990 FERC order made Public Service of Indiana the first electric company in the

nation to have blanket authority to make long-term, market-based sales. Although FERC's ruling does not extend to other utilities, it is reasonable to expect many more power companies with supply imbalances to seek open trade. The price seems to be open access of transmission lines.

Analysts predict that most new industry capacity in the 1990s will come from unregulated sources. These include utilities with excess power to sell, independent power producers that have sprung up to serve utilities or directly serve retail customers, qualifying facilities—the small generation operations that are outgrowths of the 1978 Public Utilities Regulatory Reform Act's encouragement of small, nontraditional power sources—and other nonutility players in the power market, such as cogenerators. To learn more about the impacts of increased wholesale power marketing, FERC has allowed limited experimentation with market-based transmission and bulk power sales in the Western Systems Power Pool. In January 1991 that pool proposed a ten-year agreement to replace the bulk power marketing experiment. The proposed agreement would set a ceiling rate high enough that prices on power and transmission would be market-based. FERC's initial ruling in April 1991 placed significant restraint on the market-pricing aspects of the new agreement. Regional transmission "have nots" are quite leery of regulators' relinquishing pricing control. They argue that utilities owning transmission within the pool still retain great market power that could be used against competitors in bulk power markets. Those concerns tend to be directed less at short-term pricing principles and more at long-term conditions of access, in part echoing the worries stated by FERC. As FERC grapples with wholesale power market developments, abuses of market power by owners of transmission seem to play a major role in its explanations of its decisions.

Setting New Policy Directions for Transmission

Recent studies by the Office of Technology Assessment, the National Regulatory Research Institute, the Edison Electric Institute, the National Governor's Association, and FERC have analyzed barriers to competition in the electric power industry, particularly in the transmission sector. Generally, those studies focused on solutions that force transmission access, typically by mandated wheeling or common carriage. Such policies assume that market-based institutions and practices cannot both reduce market power substantially and perform efficiently.

Mandatory Wheeling and Common Carriage. Mandatory wheeling and common carriage are policies frequently proposed to yield the desired access to transmission. Since the legal foundation for regulators to order wheeling is not well-laid, without an amendment to the Federal Power Act wheeling issues will continue to be settled on a case-by-case basis. Those agreements, however, lead to more uneven treatment across the industry. Calls for a federal wheeling authority that would establish a public-interest basis for access are likely to grow.

Under a strong federal mandatory access law, independent power producers could become dominant power suppliers to today's integrated utilities, which in turn would sell within their franchises on a markup over cost. Mandatory wheeling, however, cannot guarantee that clear, detailed conditions of entry can be specified in advance so that a nonowner can understand his position under all contingencies over the long time frame of typical power contracts. Mandatory access also does not provide incentives for the owner to expand capacity. Thus, the access obtained could be for declining quality of service.

Another approach that might defuse market power in transmission is to uncouple the ownership of transmission from generation and to enforce access rules universally. Isolating and regulating only the monopolistic transmission sector would permit competitive wholesale trading among independent parties. Transmission firms still would be regulated to assure that they fulfilled obligations to provide open access. Bulk power dispatching, control functions, and other transmission services would be unbundled, and all saleable services would be subject to price and service regulation. That is common carriage.

Utilities have vehemently argued against any such "dismemberment" policy for many of the same reasons used against wheeling. Indeed, economists have added cautionary notes. Paul Joskow and Richard Schmalensee argued that without structural separation, wholesale competition in the industry is dampened by monopolistic behavior of the vertically integrated utilities, but that with a structural remedy and regulation, the disjointedness of the industry would reduce effectiveness.

Key questions, however, have remained unanswered regarding the consequences of structural separations in the industry. To date, little is known about common-carriage transmission systems. Still, the potential problems with common carriage are major economic concerns that cannot be dismissed lightly.

Under common carriage, a transmission firm would be responsible for the bulk system operations

and would be held accountable to federal standards. Federal legislation would be necessary to spin off the transmission assets now owned by utilities and to establish the new regulatory framework, shifting most authority to the federal government. Very little would remain for state regulators to do with respect to the transmission operation or the wholesale trading of utilities and other independent power producers. Only at the local, retail level would states have regulatory authority.

Because restructuring undoes a system of political-economic control used for over eighty years in the United States, the transition to new transmission organizations would be legally complex; utilities and state utility commissions can be expected to battle those changes and make the passage of essential, comprehensive federal legislation even more difficult. Utilities frequently frame their defense against invasions of their transmission lines

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by emphasizing the utilities' commitment to the franchised consumer; the argument is politically powerful and should be anticipated.

In sum, a transmission grid, structurally isolated and obligated to act as a common carrier, would be forced into critical decisions without close coordination with its users. Utilities today implicitly concede the weakness of existing transmission development practices when they plead that the present systems cannot handle diverse market demands. Forcibly opening transmission to "permit" competition would provide owners with a further disincentive to develop transmission wisely. The weaknesses of common carriage, however, do not imply that all structural reforms are similarly flawed. Structural transmission reform need not be imposed in this manner: market-based structural remedies are available.

User-Owned Transmission Grids: A Proposal

In the past, because of the large risks of building "user-specific" electricity generation, exclusive

franchising was justified as a method of securing markets for producers. Yet those investment risks can be substantially reduced if the assets in question are made less specific to particular users so that they give participants a broader market sweep. User-ownership of large transmission grids can extend the market, thereby diminishing the value of vertically integrated firms such as most utilities: the grid's openness increases the worth of nonintegrated producer-marketers and middlemen who perform their limited tasks very well compared with cumbersome utility giants. Thus, by increasing the scope of the market, more independent producers may be willing and able to enter and invest—perhaps even without long-term contracts in hand. Conversely, retail purchasers, relying upon the large marketplace held within a transmission grid, may be willing to buy more power in less secured ways.

I propose to broaden transmission system access

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through joint, private decisionmaking, to reduce the market power residing in transmission ownership and control so that strategic manipulation is unlikely—in both the energy and the political marketplace—and to initiate the movement toward market trading in power, but not freeze the market structure.

With user-ownership of transmission systems, utilities' transmission assets would be spun off from their other operations, and government-owned transmission lines would be privatized. Transmission assets would be reconfigured into regional transmission firms owned by their users. An initial assignment of ownership would therefore have to be made. Ownership would be stated in physical capacity shares, which could be traded at any time. Participants could also acquire capacity by subscribing to a capacity addition proposed by others or by initiating their own. The owners of the transmission system would establish jointly the conditions of system access and pricing, possibly with FERC oversight. Antitrust laws would form

the primary legal safeguard against collusion. Utilities' franchised users would retain ongoing protection under public utility law; thus, utilities would have to honor all existing obligations to franchised markets. Consumers—industrial accounts, municipalities, and others who could establish ownership in local distribution systems—would have a legal option to reject public utility regulation and to engage in market purchases. Such consumers, however, also would accept the ongoing risks of market-dealing.

Such actions demand a number of careful clarifications in law, in particular, determining initial participation shares in ownership and defining a capacity right.

Initial Participation in New Transmission Firms.

The initial ownership in the new grid organizations could be assigned according to the ownership share of each current transmission owner in the new network's initial capacity; thus, utilities would receive the bulk of capacity rights in each new system. Capacity from the public sector could be sold at auction, and, as a result, some capacity would be immediately available to nonutilities. Owners of the new transmission grid, for the most part, would not be able to identify specific assets as "theirs": their ownership would consist of capacity shares that would give them authority to place demands on the overall system capacity. Capacity then could be sold or leased to any market participants in a secondary market.

The proposed policy on transmission would not deny utilities an ownership interest in transmission, but rather would reconfigure it so that rents would not persist. Removing sole ownership from utilities would reduce the probability of strategic manipulation and would therefore assist in achieving a more rapid transition to a more competitive market. Utilities would be joined in transmission ownership by nonutility users with aggressive marketing objectives demanding reliable long-term access. Such firms would be unlikely to engage in cartelization strategies. Quite clearly, too, many present-day utilities would have little desire to continue a defense of the public utility regime, and, instead, would see their interests furthered by becoming power marketers.

Under the user-ownership proposal, the movement to nonutility use and ownership of transmission should mirror the development of power markets. There would not be an immediate, radical reduction in the proportion of ownership held by utilities. On

the other hand, the shift to joint user-ownership would accelerate trade in both transmission services and electricity, while providing a structural means for the participants themselves to deal with monopoly problems.

Capacity Rights Ownership by Users in Transmission. Without public utility regulation, the U.S. electric power industry probably would have achieved user-ownership of transmission long ago as a means of both protecting and coordinating trade relations. Today, the U.S. power industry occasionally uses capacity-sharing to achieve limited joint-ownership of transmission. I propose extending that ownership by providing all potential users (many are now excluded) with the opportunity to enter a transmission capacity market by acquiring existing capacity shares in a secondary market or by subscribing to capacity shares in new transmission investments. The latter investments could be reviewed by FERC to assure that they were not manipulated by the current ownership to impede entry. Opening the transmission marketplace in that way would allow smaller firms that are not vertically integrated to enter and gain scale and scope economies in transmission.

A market-oriented policy toward transmission should begin where further market development appears feasible, and that suggests establishing joint private property rights. Doing that through capacity shares is a reasonable initiating policy that will be subjected to entrepreneurial revisions.

Capacity-sharing in a profit-based firm also must be evaluated in light of potential costs related to risks of monopolization and exclusionary practices, impediments to effective investing and financing investments, difficulties of managing under user-ownership, and pricing.

Discrimination and Exclusion. We can view the user-owned transmission system as a club in which owners share privileges as well as obligations. The essential motivation for this closed form of organization is that members capture a valuable public good—the reduced threat of monopolization among user-owners. This attribute can be “consumed” by adding members without loss of its value. Other benefits include internalizing external costs and providing a means of coordination and investing in the system. The public good that is shared within the organization can, however, be overwhelmed by other costs if intrusions are not controlled. The voluntary user-owned organization inhibits monopolization by

putting authority in the hands of those with a direct self-interest in coordinating power transmission efficiently. Although user-defined access immediately prompts concern about manipulations to deny entry, note that each owner can sell his capacity shares, enter long-term contracts with users, or sell transmission service in a spot market. An open market in capacity can exist.

Of course, those purchasing capacity also “acquire” rules placed on owners of the transmission grid. Therefore, as a basic safeguard against strategic manipulation here, the rules regarding all aspects of ownership and operation should be required to apply universally. If this were done, much of discrimination against potential transmission users would then be eliminated through the ongoing operation of markets in capacity shares and in transmission services. Rules could be reviewed by FERC for signs that they were strategically employed against outsiders.

Under user-owned transmission, much regulation targeted at market abuses should be avoidable. Undoubtedly, concerns about monopolization or cartelization of transmission, restrictions on access, and discriminatory pricing will remain. One form of regulation that can assist in preventing strategic manipulation of transmission grids by owners is antitrust law. The threat of an antitrust action can raise the costs to collusive price-fixing or to ex-

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cluding entrants. Antitrust is also less intrusive than direct economic regulation because it allows the private ownership and control of transmission grids to do much of the work. The proposed user-ownership policy would inherently leave entry open: all capacity shares would be saleable, new investments in capacity to an existing system would be feasible, and rules regarding access would be imposed universally. Those features of user-ownership form the basic defense against exclusionary and discriminatory behavior by the grid owners.

Financing Transmission Investments and Managing the System. Investments in a user-owned transmission grid could occur in two ways. Any individual

participant or coalition could add capacity to the system, subject to meeting the requirements of the grid company regarding protection of the system. Alternatively, the transmission firm could propose investments in capacity that would be subject to open subscription. Any technically competent party could add to the system in the first way without the specific approval of the user-owners. Such investors would become owners themselves and would receive systemwide unitized capacity rights, which then could be marketed as all other capacity rights. The independent avenue for investment would permit entry to the transmission sector of the industry without forcing a costly duplication of an entire system. The vital concern for policy toward transmission financing is to establish with reasonable confidence that investment opportunities can be identified and financed efficiently within a user-owned system, without denying market entry to qualified participants, and that incremental capacity can be added independently when any party expects the benefits to exceed the costs.

Management and Control Problems with User-Owned Grids. While user-owned transmission organizations are helpful in overcoming the bottleneck problem and internalizing system externalities, they are not easy to control and manage. One obvious source of organizational tension lies between two objectives: technically sophisticated management of a grid and owner-control of grid policies. The management of the grid demands considerable autonomy to assure that complex operations are handled efficiently. On the other hand, grid managers cannot engulf all the authority of the user-owners. Indeed, it would be illogical for users to

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acquire ownership for the purpose of exercising control and then to cede that authority over major policy issues to management. In general, the net value of close direction is great enough that user-owners will act as proprietors, unlike owners in publicly held corporations. Although a governance

system to mediate or arbitrate disputes would be costly and would further reduce the net benefits of user-owned transmission enterprises, it would be useful. Moreover, the net benefits of user-ownership should be compared with those of the alternatives: continued public utility regulation amended either by wheeling or by common carriage regulation. In that context, user-ownership may fare well.

Regulation of Pricing. At present, the formulas approved by FERC for pricing transmission services are based on embedded costs and are far from marginal cost pricing. The embedded cost method of pricing transmission service is typical of public utility regulation's cost-plus approach: a firm is allowed to recover a "fair" return on its historical investments plus out-of-pocket expenses. By not signalling the scarcity (marginal) value of service, embedded cost pricing leads to resource misallocation. For example, peak use clearly can damage quality of service, and embedded cost pricing does not impose those costs on the users. Conversely, a transmission system with idle capacity sets a high price under embedded cost methodology that discourages full use of the system. Here, prices covering just short-run marginal operating costs are all that would be required for efficient use of resources. Embedded cost pricing also does not account for the external costs of transmission service use. For example, it does not typically consider loop-flow problems; instead it lets those externalities "balance out" among participants.

Price regulation of transmission services should be eliminated, if this is politically feasible. Removing price regulation is sensible, considered in the context of user-ownership with tradeable capacity rights, augmented by antitrust law. The inability of regulators to define a regulatory pricing regime for transmission that does not cause significant efficiency losses is a warning that troubles await future attempts. Invariably, price regulation has become politicized, bureaucratized, and inflexible.

One oft-mentioned concern with unregulated pricing is that the transmission grid owners might engage in cross subsidization. But with each owner able to sell or lease units of capacity openly and with new investments by outsiders feasible, market power is greatly reduced. Cross subsidization fears therefore provide no convincing rationale for price and service regulation of user-owned transmission systems.

Nevertheless, a major user-ownership restructuring of transmission may be politically feasible only with price regulation. If so, rate-base price

regulation should be avoided. A modest, more promising alternative is a form of price indexation under which the regulator allows price increases up to a retail price index, less a factor representing some portion of the likely growth of technological productivity in the industry. Compared with public utility pricing, that method requires little information gathering and reduces the potential for incessant manipulation of underlying factors in the formula because the information used in the calculation is beyond any firm's control. Moreover, biases toward or away from capital will be eliminated: the formula is neutral about input factors. In addition, one's attention is fixed directly on price—the politically relevant variable. Allowing an inflationary pass-through—but sharing the gains of technological advances—seems, at first blush, to be a simple and fair way of dealing. Finally, by permitting the firm to retain profits, the method rewards good performance. Needless to say, however, the best price regulation for transmission under user-ownership is simply none at all.

Conclusion

Opponents of greater transmission access point to the technical complexity of power operations and to the cost externalities related to access. Forcing utilities to yield transmission access, they claim, would increase costs and reduce the reliability of service to existing users. They also protest that vertical disintegration of today's public utilities is a radical, hence dangerous, departure from the public utility regulatory system. To some minds, the utilities and consumers have forged "compacts" by which fair treatment to both sides demands that the rules of the regulatory game not be changed dramatically.

Although threats to system reliability are real, claims that transmission networks cannot accommodate greater competition ring hollow. A major cause of the stunted development of markets in electric power today is that regulation has not been allowed structural responses to changes in technology and competitive practices.

I have argued that the basic transmission issue to be resolved is not whether to permit access, but whether to initiate a system of well-defined, private property rights in transmission so that monopoly threats are reduced by the nature of the incentives before the owners. By producing tradeable capacity rights in transmission capacity and allowing open

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entry for regional system investments, the user-ownership proposal would resolve many of the market-power concerns. It could do this without sacrificing broad planning and coordination and without forming superutilities and superregulators. Such a user-owned transmission organization would keep transmission noncollusive, would broaden the transmission system, and would retain the flexibility for that market to evolve as changes occur in other markets. Achieving those objectives would make good public policy for this sector and would accelerate the movement to power marketing in the United States.

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