INDEPENDENT TRANSMISSION COMPANIES IN A REGIONAL TRANSMISSION ORGANIZATION

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December 20, 2001
Revised: January 8, 2002

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EXECUTIVE SUMMARY

As part of electricity restructuring in the United States, there is broad interest in the concept of an independent transmission company (ITC) that would operate as a stand-alone, for-profit transmission business. The Federal Energy Regulatory Commission has encouraged ITCs by offering to consider incentive rate mechanisms in conjunction with Regional Transmission Organizations that meet the requirements of Order 2000. However, the appropriate role of an ITC within the RTO framework remains unsettled. Some proposals would have the transmission company (Transco) be the RTO and perform all of its functions, even market operations. Hybrid proposals would have the Transco control some of the RTO functions but delegate the activities associated with market operations to a third party. This paper describes a third model, a market-compatible ITC that would neither be the RTO nor assume the RTO's public interest functions.

The for-profit nature of a monopoly Transco and its claimed ability to make efficient tradeoffs across market operations, system control, grid management and investment give the Transco its initial appeal. On closer inspection, however, the implications of these tradeoffs for market participants and concerns about leaving the RTO's public interest functions distorted by the Transco's private interests create a need to ensure independence for both system and market operations, so that functions necessary for an efficient market are performed in an unbiased manner.

Fortunately, the concerns with the pure Transco model do not foreclose a viable approach with for-profit ITCs that operate in conjunction with a separate and independent RTO. An ITC could complement the RTO but not be the RTO. It would respond to the market's price signals to pursue market-driven grid investments, but it would not run the RTO markets. This ITC would be compatible with the Eastern markets that use coordinated spot markets, locational marginal pricing (LMP) and financial transmission rights (FTRs). Separating an ITC's ownership/investment functions from the independent RTO's system/market operation functions would allow both to pursue their respective objectives, but with the ITC free to aggressively pursue its private interests without concerns about biasing the market. It would then be simpler to ensure independent RTO governance and a focus on the limited but essential tasks that the RTO must perform. Within this open architecture, multiple transmission owners, both private and public, traditional utility transmission owners and ITCs, could then be accommodated without requiring the RTO to be the monopoly grid owner.

Properly defining an ITC's role in the RTO structure addresses the concern that the RTO might have insufficient mechanisms to stimulate the grid investments necessary

for a competitive market. The key is to recognize that in a market structure, transparent market prices and the award of property rights provide essential investment incentives. The need is for market rules that efficiently price the value of transmission usage and hence send clear signals about the value of grid investments that expand that usage. A companion need is for tradable property rights that the RTO would award to those who fund grid expansions, giving the investors a means to capture the market value created by their investments. Thus, it is not monopoly control of the RTO functions that solves the grid investment problem, as the Transco model assumes, but rather profit-motivated firms responding to market prices and incentives, supplemented by a regulatory backstop that steps in only when markets fail.

Solving the investment problem without compromising the RTO's independence means the RTO can avoid concerns about subjecting its public interest functions to the influences of the Transco's legitimate but private interests. The initial concern focused on whether a grid owner as RTO might still be affiliated with generation and marketing interests. But even if a Transco is stripped of these interests, a more fundamental concern is that the owner's interests in pursuing profitable grid investments or performance incentives tied to these investments would conflict with the RTO's public interest duty to operate congestion management and transmission rights markets in an unbiased manner. The concern recognizes that transmission may often compete with generation and demand-side investments, and there can also be competition between multiple transmission companies to capture the same economic value in reducing congestion.

Transco proposals have responded to these matters by offering to carve out several core functions for the Transco while leaving the market operations to a "disinterested third party." In theory, other functions in which the private business interests and motivations of the grid owner might conflict, or be perceived to conflict, with the need for unbiased, non-discriminatory performance of the RTO's public interest functions might raise similar concerns.

A market-compatible ITC without these conflict concerns would have several fundamental business objectives:

- As a stand-alone, for profit transmission business, an ITC would own and maintain transmission systems and operate them in conjunction with, and under the direction of, an RTO.

- An ITC's initial transmission assets could continue to be rate-based, and the ITC could receive a tariff-based rate to cover its revenue requirements.

- An ITC could function as a merchant transmission business, pursuing market-based returns (and facing market risks) on market-driven investments in grid expansions. An ITC could pursue these investment opportunities in any RTO that provided an appropriate market framework of coordinated spot markets, efficient transmission pricing and the award of financial transmission rights.

- An ITC could be the regulated transmission "builder of last resort" for any economically justified enhancements recommended by the RTO grid planning process and approved by regulators in the event of market failure. An ITC would be a key participant in the RTO's planning process but not control it.

- An ITC could be eligible for performance-based incentives that would be structured to ensure FTR funding and encourage efficient grid maintenance.

- An ITC could define and offer innovative services to participants.

An ITC would take advantage of the efficient price signals provided by coordinated spot markets, LMP spot prices, LMP-based usage charges and the award and forward trading of FTRs. Using these market incentives, an ITC would seek out profitable investments in grid enhancements, either on its own or in conjunction with investment coalitions formed from those who would benefit from reducing the effects of congestion on market prices. Beneficiaries might include generators seeking access to transmission-constrained regions, load-serving entities (or large customers) in constrained regions seeking access to lower-cost generation, and marketers seeking lower usage charges.

The award of property rights in the form of FTRs would provide an ITC with an effective means to capture and retain the market value of its investments or to attract investors. An investment opportunity might be attractive based on the ITC's ability to sell the awarded FTRs at market prices to other market participants or on the value to the ITC of receiving the stream of expected settlement revenues from the awarded FTRs.

To be sure, market failures could arise that could frustrate market-driven investments. Free rider issues might prevent investment coalitions from forming, but an ITC could still pursue attractive investments on its own driven solely by the market value of the incremental FTRs. However, more serious market failures would require a regulatory backstop to ensure that economically justified expansions were built once the regulators determined that market failures precluded market-driven investments.

An ITC would also be eligible for performance-based rate incentives. For example, an ITC could receive incentive rewards for superior maintenance while guaranteeing funding of FTRs in the event of grid outages for which the ITC was responsible. The PBR mechanism's rewards and penalties would encourage efficient maintenance and be based on grid outputs that were within the ITC's operational control.

The alternative Transco model would structure the RTO around a dominant or exclusive grid owner but with incentives to align the interests of the grid owner to support an efficient market. Various arguments have been suggested for this arrangement. One is that a stand-alone transmission company may not be viable unless it has complete control over how its assets are used, managed and operated. However, this implies that system and market operations must be biased in favor of the owner's interests, an argument that has serious implications for other market participants. Another is that at least system operations should remain with the grid owner, even if a third party performs market operations. But this structure has proven to be unworkable in California and elsewhere. The problem is that system operations and the markets for imbalances and congestion flow from exactly the same bid-based dispatch. The functions are inseparable in the very short-run time frame in which a central operator must coordinate grid use to maintain reliability. A third argument is that a grid owner must control access to its facilities, but we know from ISO experience in the Eastern markets that this is neither true nor practical in an RTO, as only one entity can control access to the same grid at the same time.

A related argument is that the Transco must control operating decisions, so that it can make tradeoffs between investments and operations as driven by a high-powered regulatory incentive system. This implies that in making its tradeoffs, impartial market operations could be compromised if needed to serve the Transco's interests, unless there were persistent regulatory oversight. Further, if the argument were true, other features would follow. The Transco would need to be a total monopoly, as non-RTO transmission companies could not survive or expect to be treated comparably. And we would be betting the industry's success on the ability of regulators to get the incentives right as they tried to deal with an increasingly powerful and opaque monopoly.

Experience in the United Kingdom, where a more or less pure transco has been implemented, as well as transco-like proposals in the U.S., suggest that the real issues raised by the Transco model are its implications for market design. The U.K. market has adopted a very different market design from the design that has worked well in the Eastern U.S. In the U.K. structure, the absence of LMP congestion pricing and LMP-based property rights eliminates any possibility for market-driven investments for grid expansions. The monopoly grid-owner/operator must therefore rely on incentive rates defined by the U.K. regulators to induce the grid enhancements that lower congestion uplift costs to levels deemed acceptable by the regulators. And the absence of efficient pricing requires the monopoly owner/operator to rely increasingly on non-market means to manage the grid.

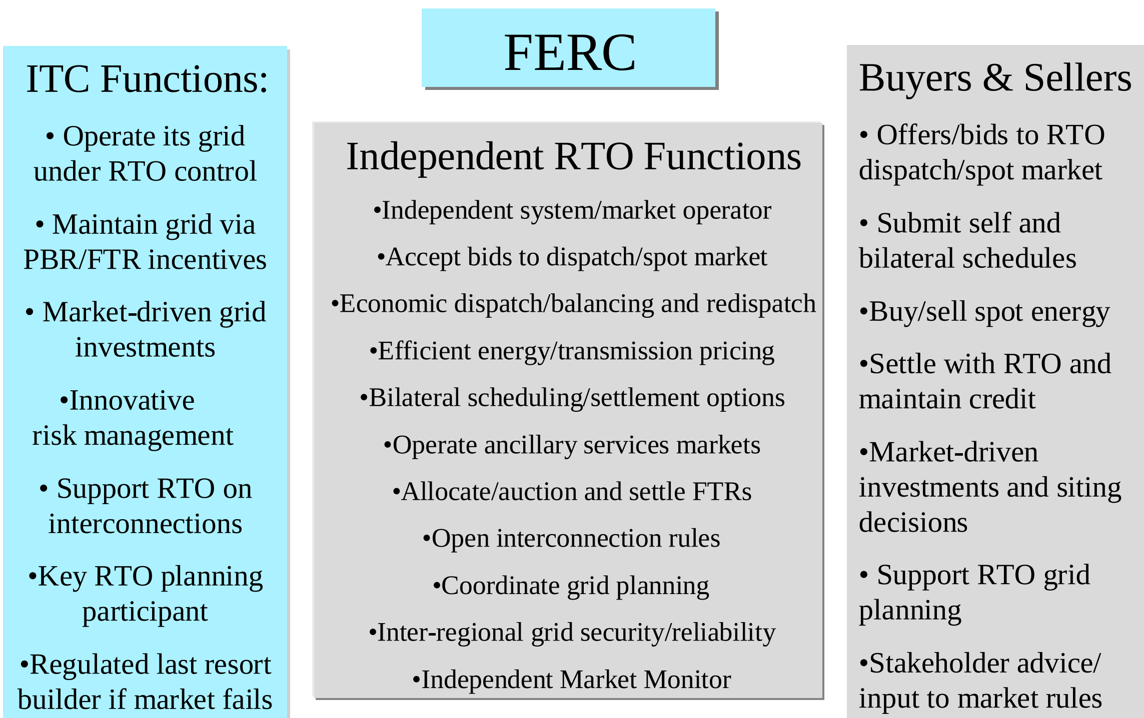
Because the U.K. structure would probably not satisfy the more market-based requirements of Order 2000, the U.S. discussion of Transcos has evolved towards hybrid Transco models. Several "core" functions are preserved for the Transco, while market operations are assigned to a "disinterested third party," such as an Independent Market Operator/Administrator. However, it is still unclear how the IMO would be truly independent from the Transco; having the IMO subject to the Transco or its board would not appear to be sufficient. At a minimum, we would need greater oversight by FERC to avoid both the reality and the perception that the IMO's market operations could become biased in favor of the Transco's business interests.

In the end, the Transco-plus-IMO would need to function under the same market designs and pricing rules as other RTOs. All of the arguments for a standard design apply. Indeed, if the Transco argued that its market rules must be different, this would imply that the Transco-plus-IMO can only succeed with market designs, dispatch and pricing rules that were deliberately compromised to favor the Transco's private interests.

In sum, a model ITC could satisfy the reasonable desires for a for-profit, transmission business that is compatible with the successful market designs emerging in the Eastern United States. Its functions and motivations complement those designs, taking advantage of the opportunities for market-driven investments presented by pricing transmission usage with LMP and awarding incremental FTRs for transmission expansions. A more rational split of functions between any ITC (and other grid owners) and the RTO would then be possible.

Figure 1

An ITC Complements the Market But Doesn't Run It
The RTO Remains Independent



By leaving the public interest functions to a fully independent RTO, an ITC would be free to pursue investments vigorously without concern that its private interests would undermine the market's need for unbiased system and market operations. And by uncoupling grid ownership from RTO design, we would simplify the tasks of governing the RTO and ensuring efficient markets and unbiased operations. The essential task, therefore, is to implement the standard market design with its coordinated spot markets, efficient pricing rules and financial property rights, and then allow market-compatible ITCs to emerge.

INDEPENDENT TRANSMISSION COMPANIES IN A REGIONAL TRANSMISSION ORGANIZATION

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December 20, 2001

Many transmission-owning utilities in the United States are giving serious consideration to moving their transmission assets to an independent transmission company (ITC). As a stand-alone, for-profit company devoted to owning, building and maintaining electric transmission facilities, the ITC would operate the systems it owned within the framework of a Regional Transmission Organization (RTO). Part of the ITC appeal is the prospect of pursuing investment opportunities that could be more attractive than those likely under traditional regulation or that may occur outside a transmission owner's original service area. Other market participants may see the concept as a mechanism for fully separating ownership and operation of the grid from a utility's generating and marketing interests. The Federal Energy Regulatory Commission (FERC) has encouraged this movement by offering to consider incentive rate mechanisms for ITCs in conjunction with the creation of RTOs that meet the requirements of Order 2000. FERC has also approved the creation of a few single-system ITCs, while giving its initial support to efforts to create larger, multi-system ITCs.

Despite the widespread interest in ITCs, the appropriate role of an ITC within the RTO framework of Order 2000 remains unsettled, and there are alternative concepts under consideration. One extreme would be a transmission company ("Transco") as both the grid owner and the RTO, performing all of the RTO functions required by Order 2000. Variations of this approach would have the Transco or ITC perform only some of the RTO functions, such as operating the grid, defining available capacity, allocating

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access to transmission customers and/or overseeing grid planning, while assigning market operations to a disinterested third party. An alternative approach would encourage the creation of ITCs within a broader RTO framework, but would purposely not have the ITC be the RTO nor have it assume the RTO's essential functions. Examples with elements of these alternatives have been presented to FERC for at least initial approval.[2]

On the surface, a monopoly Transco with full responsibility for all transmission activities would seem like the natural approach. The for-profit Transco would be consistent with the market orientation of electricity restructuring. Basic principles of good management and property rights would dictate that control of assets should go in hand with ownership. The Transco would be a monopoly as would be required by the monopoly characteristics of transmission service. Regulation of the monopoly would be indicated, but performance-based incentive regulation would harness the interests of shareholders and management to support the broader policy objectives for the electricity market. With substantial transmission assets at risk, regulators would have the tools and shareholders the motivation to improve performance and maximize efficient utilization of the grid. The pure Transco model would therefore seem a familiar extension and improvement of the traditional approach to organization and regulation of monopoly utilities that preceded electricity restructuring.

Just a little below the surface, however, the assumptions of the pure Transco model can be seen to stand on a flawed foundation that ignores the special characteristics of the electricity system. Close examination reveals that the contradictions of the pure Transco model arise from the same difficulties that drove the development of the RTO concept in the first instance. The complications of network interactions, special requirements for a coordinated spot market, demands for independence and non-discrimination, fragmented ownership of the grid and mixed jurisdictions -- all the realities that precipitated the need for and design first of independent system operators and then of RTOs -- appear again to make what looks natural on the surface to be unworkable in reality.

However, concerns with the pure Transco model do not foreclose a viable approach with for-profit ITCs that operate in conjunction with a separate and independent RTO. The task here is to describe this approach and outline the division of responsibilities among the RTO, an ITC and the regulators. This calls for an ITC model that would complement the RTO but not be the RTO. This ITC model would satisfy the objectives of a viable, stand-alone for-profit transmission company, but the ITC's business objectives would be compatible with emerging standard market designs in the Eastern markets and elsewhere. An ITC should enhance the efficiency of the total electricity market, bringing a measure of competition to transmission by pursuing market-driven investments in grid expansions. Moreover, in competition with generation and demand-side options, an ITC could exploit attractive investment opportunities created by

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2 An example of a Transco-as-RTO model has been offered by the Alliance transmission owners. Intermediate proposals have been suggested by transmission owners during the RTO mediations in the Southeast and Northeast. The alternative ITC approach, as described in this paper, has been pursued by several entities in the Northwest, PJM, the Midwest and elsewhere.

the market's efficient price signals, without requiring the ITC to operate the RTO markets nor compromise the need for efficient, unbiased market and system operations. The RTO's role would be focused on unbiased market operations, reliability and associated planning functions, free of any potential conflicts from pursuing grid investments in competition with other market participants. It would then be simpler to structure RTO governance in ways that assure independence and focus on the limited but essential tasks that the RTO must perform.

Why The Role of ITCs Matters

At least two key policy considerations underscore the importance of choosing wisely from among these alternative concepts. One consideration is the need to foster an overall industry structure that ensures efficient investments in the transmission infrastructure. Throughout the debate on the structure and functions of RTOs, a persistent theme has been the concern that the RTO framework might have insufficient mechanisms to stimulate the transmission investment necessary to support a competitive market.

The superficial argument has been that the RTO structure itself must therefore be "for-profit" and directly tied to transmission ownership and investment. However, this argument needlessly ties the ownership/investment functions, which undoubtedly can be pursued through independent for-profit transmission companies, as well as more traditional forms of grid ownership, with the critical public interest functions associated with system operations to maintain reliability and coordination of efficient markets. Separating these concepts and functions not only simplifies the RTO's tasks of ensuring independent, unbiased and efficient system/market operations, but also liberates the transmission company to pursue market-driven investments in transmission more aggressively, free of legitimate concerns about conflicts between public and private interests.

Moreover, the argument ignores the fact that in a market structure, transparent market prices provide an essential stimulus for market-driven investments. If we want market-oriented ITCs, and not just monopolies that are dependent on well-crafted regulatory incentives, we need market rules that efficiently price the value of transmission usage and hence send clear signals about the value of grid investments that expand that usage. We also need market rules that provide tradable property rights that can be awarded to those who fund grid expansions, so that those who undertake the investments have a mechanism to capture the increased market value of the grid they have created. Hence, in a market paradigm, it is not monopoly control by a single grid owner of the RTO functions that solves the grid investment problem but rather intelligent market design and efficient pricing, along with the award of incremental transmission rights to those who fund merchant transmission investments. Once this *market-based* incentive structure is in place to support market-driven investments, there can be complementary rules for traditional regulated investments in the event of market failures.

Furthermore, we need not automatically assume that a for-profit structure is necessary to solve the investment problem. The success of some government-owned utilities within their respective service areas suggests that attaining this goal does not require an exclusively for-profit approach. If efficient market prices signal the value of transmission upgrades, and investments are rewarded with valuable property rights, then government-owned entities can also respond to these incentives. In other words, FERC does not need to take on the debate about public versus private ownership to address the essential issue.

Nor do we need to resolve whether transmission ownership should or should not be totally independent of generation and/or merchant interests as a precondition for forming truly independent RTOs. Market-driven ITCs may well be an appropriate model for grid ownership in a market structure. But for now there do not appear to be compelling reasons to conclude that all grid ownership should meet the criterion of independence, provided that an independent RTO performs the public interest functions related to system and market operations in an unbiased manner. The RTO's independence thus facilitates the open architecture FERC has been seeking with respect to multiple forms of grid ownership, making it more likely that alternative public and private forms can join RTOs.[3] In short, we need not force regulators or grid owners to choose a single form of grid ownership now, before the long-run financial feasibility and attractiveness of stand-alone transmission companies are fully established.

To be sure, most of the nation's transmission grid has been built and operated by for-profit utilities, usually vertically integrated and always closely regulated. Now, however, the nation's electrical system is moving increasingly towards a market structure with competitive and increasingly unbundled generation, merchant, and retailing sectors. As the functions of formerly integrated companies become unbundled, there is a desire for a workable business model for a stand-alone transmission enterprise.

The ITC business model must be compatible with the emerging market framework, including the central role of an RTO in supporting the market. Within this market framework, a transmission business model must be capable of responding to market-based pricing, while filling the role in transmission investment previously assigned to integrated utilities. Since short-run prices for energy and transmission (including the value of transmission rights) are largely defined by mechanisms operated by the RTO, this naturally raises the question of what the appropriate role of the grid owner(s) should be in the RTO and market framework, as well as what market structures and designs the RTO should adopt to provide the appropriate investment incentives.

A second policy consideration arises from the recognition that there are unmistakable *public* interests inherent in most, perhaps all, of the required RTO functions. Among other functions, the RTO must control grid operations, ensure non-

[3] This also suggests that FERC's insistence that only "independent" transmission companies can be eligible for incentive rates could be relaxed in ways that further RTO formation and objectives. For example, non-ITC grid owners could be eligible for incentive rates, with specific proposals examined on a case-by-case basis. Eligibility might then turn not on whether the grid owner itself was "independent" but rather on such factors as whether the owner brought its transmission under the control of an independent RTO and how well the incentive proposal itself contributed to the public interest goals of the RTO.

discriminatory access for those who seek to use the grid, and operate short-run markets to maintain system reliability and facilitate market trading. For example, an RTO must provide at least a real-time balancing market and market-based approaches to manage congestion. "The RTO must be responsible for running the energy balance market and maintaining balance on a real time basis within the regional system, as well as acting as provider of last resort for all ancillary services, including regulation."[4] Order 2000 requires that the RTO perform these functions in an unbiased manner, in support of the broader public interests in reliable operations and efficient markets. A critical issue is thus whether it is appropriate to allow an entity with legitimate but undeniably *private* interests in running a transmission business and pursuing grid investments as a for-profit enterprise to be responsible for performing the *public* interest responsibilities of the RTO in coordinating markets and related system operations.

As long as the industry was dominated by vertically integrated utilities, we accepted this combination of generation, transmission and system operational functions as logical, even necessary to ensure reliability, while closely regulating the utility monopoly's performance of every function. Most would agree that this structure successfully kept the lights on for decades, albeit with varying degrees of concern about the required scope of regulation and its overall efficiency. However, the emergence of independent generation and merchant functions logically created a need for independent system operations, hence the emergence of ISOs. The value of using bid-based market mechanisms both to assure non-discriminatory grid access and to ensure the efficiency of the system operator's functions led logically to the need for unbiased market support functions performed by an independent RTO. This logical progression, initially articulated by FERC's Order 2000 and since restated and refined by subsequent RTO orders, dictated that the RTO must be not only the regional system operator but also an unbiased, independent market operator for at least the short-run markets associated with system operations. Cleanly separating grid ownership and market-driven investment functions from independent system/market operations would appear to be required and logically consistent with this framework. Moreover, successful ISO experience in the Northeast has shown that it is not necessary to have the grid owner perform system operations and related market support functions. On the contrary, the need for unbiased operations in the public interest makes it legitimate to ask whether it is appropriate to allow the grid owner to retain these functions.

Concerns about this issue and its broader implications have been raised by parties in all of the RTO formation discussions, including FERC's RTO mediations, and by FERC itself. Several participants who testified at FERC's "RTO week" (October 15-19, 2001) appeared to agree that, at a minimum, the grid owner, even a supposedly "independent" grid owner, should not be allowed to "run the RTO markets." Initially, the concern focused on whether a grid owner might still be affiliated with generation and marketing interests. However, even if the owner is independent of these interests, a more fundamental concern is that the grid owner's legitimate private interests in pursuing

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4 Roy Thilly, "Supplementary Comments Of Roy Thilly, CEO, Wisconsin Public Power Inc.," Federal Energy Regulatory Commission, Electricity Market Design and Structure, Docket No. RM01-12-000, November 2, 2001, p. 5.

profitable grid investments or performance incentives within the RTO footprint could conflict with the RTO's public interest duty to operate the congestion management and transmission rights markets in an unbiased manner.

The manner in which the RTO manages and prices congestion, and the way in which it defines, allocates and settles transmission rights, are critical to the investment decisions of other market participants. Among other impacts, these functions can materially affect the market value of competing investments in new generation, load management and grid enhancements to solve the same congestion problem. Implicit in this concern is the recognition that transmission may often compete directly or indirectly with generation and demand-side investments, and there may also be competition between various merchant transmission investors seeking to capture the same economic value.[5]

By now it is widely recognized that a simple aggregation of all possible transmission related activities under the wing of a pure Transco is simplistic and unnecessary. For example, National Grid USA has presented its views on the delineation and separation of RTO functions and the core responsibilities of a for-profit transmission company. Although there could be some further development of the details, the broad outline assigns virtually all provision of ancillary services, and apparently the critical activities of generation redispatch for balancing and congestion management, outside the realm of core transmission company functions and therefore amenable to management by a "disinterested third party."[6]

The potential conflicts may extend to other RTO functions, such as coordinating maintenance outages, defining available transfer capability and long-run grid planning, where the grid owner might reasonably be perceived as a competitor with the interests of generation, load management or independent merchant transmission developers. In short, any function in which the private business interests and motivations of the grid owner might conflict, or be perceived to conflict, with the need for unbiased, non-discriminatory performance of the RTO's public interest functions might raise similar concerns. Given this logic, FERC has called for public comment on the role of transmission companies and is apparently reexamining its earlier assumptions that grid ownership and investment functions can be combined in the same entity that performs the RTO's market support functions.[7]

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[5] For example, congestion can be relieved by building more generation or load management in a constrained region, or more loads in unconstrained regions. Hence, these investment options can, and often do, compete with transmission enhancements.

[6] National Grid USA, "Response of National Grid USA to Questions Posed by the Commission," Federal Energy Regulatory Commission, RTO Developments in the Midwest, etc. filed in Docket Nos. EX02-3-00, RT01-88-888, RT01-87-000, EL01-80-00, November 2, 2001, p. 9.

[7] FERC Notice of November 20, 2001, issued in Docket No. RM01-12-000.

Defining a Market-Oriented ITC

An ITC compatible with FERC's policy initiatives would have several fundamental business objectives. First, an ITC would be a stand-alone, for-profit transmission business. An ITC would own and maintain transmission systems and operate them in conjunction with, and under the direction of, an RTO.

With respect to currently rate-based facilities, an ITC would continue to receive a tariff-based rate to cover the revenue requirements for these traditionally regulated activities and assets. Within its portion of each RTO-coordinated grid, an ITC would also be the regulated transmission investor or "builder of last resort" for any economically justified grid enhancements recommended by the RTO grid planning process and approved by regulators. The ITC would recover its revenue requirements and pursue regulated rates of return for these regulated (non-market-based) investments, just as regulated utilities do now.

However, an ITC would not be limited to regulated investments and returns. Within the market framework, an ITC would be free to pursue market-based returns (and face market risks) on market-driven investments in transmission upgrades and expansions. That is, it would function as a merchant transmission business, pursuing profitable investment opportunities in any grid region in which an RTO provided the essential conditions that were conducive to market-driven investments. Defining these essential elements and ensuring that they were included within each RTO's tariff and market rules would therefore be critical to the ITC's success.

Because an ITC would not be the RTO, the scope of the ITC's transmission system need not be coextensive with an RTO's footprint. There could be more than one ITC within a given RTO, and an ITC could coexist with non-ITC grid owners within any given RTO.[8] An ITC could own and operate any part of the grid subject to RTO control and could own and operate systems in more than one RTO. Similarly, it could pursue market-driven investments in any RTO's region, whether or not it previously owned transmission within that RTO's footprint.

An ITC would be structured to complement and reinforce the efficient market designs that have emerged in the Eastern United States, but without raising the conflict issues inherent in the Transco structures. These market designs are built around open, bid-based spot markets and the use of nodal locational marginal pricing ("LMP," or "nodal pricing"). The efficient price signals that emerge from these markets provide a platform for market-driven investments in transmission, as well as competing investments in generation and demand-side measures.

From an ITC's standpoint, the critical feature of an LMP-based market is that the RTO uses a coordinated spot market and LMP to price the value of transmission usage and thereby provides transparent signals about the market value of transmission upgrades.

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[8] This flexibility would not be possible if a single transmission company sought to perform any of the RTO's public interest functions on an RTO-wide basis.

The award of property rights in the form of financial congestion hedges, and the prices at which these rights are acquired and traded in forward markets, complete the incentive structure for market-driven grid expansions.[9]

Unlike concepts that allow transmission companies to control RTO activities, the model ITC described here would have every reason to support and reinforce this efficient market design. The ITC's primary business case and its ability to pursue market-driven investments and market-based returns would depend on its ability to take advantage of the efficient price signals and property rights provided by that market. Indeed, the ITC would have an incentive to encourage the standardization of this efficient market design across the nation's entire interconnected grid.[10]

The ITC and Market-Driven Investments

By understanding the fundamentals of system and market operations and congestion pricing, an ITC would take advantage of the efficient price signals provided by LMP spot prices, LMP-based usage charges, and the award and forward trading of FTRs. Using these market incentives, the ITC would seek out profitable investments in grid enhancements, either on its own or in conjunction with investment coalitions. Such coalitions could arise from market participants who stood to benefit from grid enhancements that reduced congestion or who perceived sufficient value from the award of FTRs for the increased grid transfer capability made possible by the expansions.

Any time that the expected costs of paying for congestion exceeded the costs of an enhancement, the enhancement would be economically justified. When the projected congestion costs exceeded investment costs (including profit expectations), the enhancement would become potentially attractive to the ITC and to investment coalition partners.

On a heavily congested grid, a particular enhancement could reduce the congestion costs and related usage charges for many participants. The beneficiaries might include generators seeking access to higher-priced, transmission-constrained regions; load-serving entities (or large customers) in constrained regions seeking access to lower-cost generation; and marketers seeking lower usage charges for point-to-point transactions. These parties would be potential members of an investment coalition either on their own or in partnership with an ITC.

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[9] The Appendix provides a summary and illustration of the market design and pricing rules.

[10] As we discuss below, concepts that require the transmission company (Transco) to be the RTO and run the RTO-coordinated markets may create an inherent profit motivation to undermine the efficiency of the market and the market pricing rules that an LMP-based RTO uses to manage and price congestion. Such actions would then help the Transco gain regulatory approval for incentive rates for investments to relieve the growing levels of congestion that would arise from the inability of the market --and market prices -- to manage congestion and allocate grid use efficiently. This is a key feature of the U.K. market structure.

Appropriately chosen enhancements would increase the grid's net transfer capability. The RTO's market rules would therefore award to the ITC (or to any group of investors in grid expansions) the incremental FTRs made possible by the grid enhancements.[11] The award of these property rights would provide the ITC or other investors with an additional means to capture and retain the market value of its grid-enhancing investments or attract investors. An investment opportunity might therefore be attractive based solely on the ITC's ability to sell the awarded FTRs at market prices to other market participants. Or it might be based simply on the value to the ITC of receiving the stream of expected settlement revenues for any FTRs the ITC retained.

In any event, it would be reasonable for a market-driven expansion to relieve some congestion, but not necessarily relieve all of the congestion in a given region. That is, some congestion would be economic in the sense that it would be cheaper to pay congestion charges than to upgrade the grid enough to remove the congestion entirely. Because some economic congestion would remain, even after an appropriate grid expansion, the awarded FTR's would continue to have value to the investors, albeit less then the value before the expansion. And if grid usage expanded, and congestion increased, the awarded FTRs would shield the investors from the risks and become increasingly valuable over time.

An ITC and other parties responding to market prices and the value of incremental FTRs could therefore play a pivotal role in helping to ensure adequate and efficient levels of investment in grid infrastructure to support inter-regional electricity markets. All participants would have market-based incentives to pursue economically justified investments to expand the grid, and they would be motivated by the market value of these enhancements to pursue the most economically attractive enhancements relative to competing investments in generation or demand-side management.

In pursuing these market-driven investments, an ITC would participate in the electricity market as a competitor, attempting to capture the same economic value and responding to the same market price signals that drive potential investors in generation and demand-side options. This would have beneficial implications for achieving an efficient mix of generation, load response and transmission infrastructure. At the same time, because it was a market competitor, an ITC would be subject to market risks, as well as the potential for market returns.[12]

[11] Not all grid investments expand transmission capability, and some may expand capacity under some conditions or at some locations, but actually decrease it in others, thus negatively affecting the simultaneous feasibility (and the full funding) of previously allocated FTRs. In these cases, the RTO rules could provide that a particular enhancement would result in the award of favorable FTRs for the grid-enhancing portions and also the award of counterflow FTRs (e.g., FTR obligations in the opposite direction) for grid-contracting portions. This mechanism would preserve simultaneous feasibility and tend to encourage the most efficient expansions. The Northeast ISO markets are currently developing the rules for awarding rights to meet these goals. See, Scott Harvey and Susan Pope, "MSWG Expansion TCC Approach," memo to the New York ISO and Market Structure Working Group, November 15, 2001.

[12] Because generation investments could capture the same economic value in relieving congestion as a grid upgrade, we might expect ITCs to minimize their market risks by selecting grid enhancements in situations where new entry by larger generators in the constrained region would be less likely.

To be sure, the sheer difficulty of gaining regulatory/environmental approval and community support for new lines or corridors that has dogged utilities would apply to an ITC as well, whether or not expansions were economically justified. Well-defined siting processes in which alternative routes are considered and all concerns are examined and resolved in an open, timely fashion are still needed under any structure.

In addition, market failures could arise that would frustrate market-driven investments even if siting issues were not a factor. For example, free-rider problems could prevent effective investment coalitions from forming, as potential beneficiaries of reduced congestion withheld financial backing and waited for others to undertake the necessary investments. In these cases, an ITC could undertake the investment alone if it perceived sufficient market value in the FTRs it would be awarded and if it judged the market risks to be acceptable. However, if more serious market failures discouraged even an ITC from pursuing clearly worthwhile investments, then a regulatory backstop would be necessary to ensure that economically justified expansions were undertaken. In that case, the ITC could serve as the investor/builder of last resort (within its region) for any economically justified expansions sanctioned by the RTO planning process that were unlikely to be pursued in response to market incentives. For these investments, rates based on traditional revenue requirements and regulated returns would apply.

Two important criteria would be necessary to ensure that regulated investments did not diminish the likelihood of market-driven investments. First, the same economic justification that drives market-based investments should apply for regulated investments. Regulated grid enhancements to relieve congestion should not be undertaken unless the proponents can demonstrate that the costs of congestion exceed the costs of the expansion to relieve that congestion. Second, there should be a convincing showing that, notwithstanding this economic justification, one or more market failures prevented the market from funding and undertaking the grid enhancements. This condition would be necessary to prevent regulatory solutions from co-opting the market and undermining the benefits of market-driven solutions. Moreover, once the enhancement gained regulatory approval, regulators would need to allocate the costs to the beneficiaries, rather than simply rolling the costs into existing rates and spreading the costs across all ratepayers, beneficiaries or not. In addition to being a fair cost allocation principle, this rule would tend to discourage free riders and thus increase the likelihood of market-driven investments.

Because it would often function as a market competitor, an ITC would not operate the RTO-coordinated markets or related system operations, leaving these functions to the independently governed RTO. While performing essential investment functions as a private, profit-seeking business, an ITC would not assume the RTO's market support functions, nor would it be in a position to compromise the RTOs responsibilities to operate an open, efficient market in the public interest. Conversely, the RTO could be governed by an independent board that could focus exclusively on assuring the competence of the RTO management and the unbiased and efficient performance of the RTO's market support functions.

An ITC and Performance-Based Incentives for Efficient Grid Maintenance

While an ITC would be focused on market-driven investments and meeting its regulated obligations as the transmission builder-of-last-resort, it (and possibly other grid owners) could also be eligible for performance-based incentives that were compatible with the RTO's market structure. One such mechanism would involve an ITC in assuring the settlement funding of FTRs, and its goal would be to encourage the ITC to maintain the grid's capacity in an efficient manner.

The RTO would fund the FTR settlements from the congestion rents it collected from those who paid nodal prices for spot energy and those who paid LMP-based usage charges for point-to-point transmission schedules. Under normal conditions, the settlement surplus collected by the RTO under LMP would be sufficient to pay the holders of the FTRs the full value of their hedges during each settlement period. However, this revenue adequacy would hold only if the grid's available capability did not fall significantly below the capacity assumed during the RTO's allocation or auction of the FTRs.[13] If the grid capability were less than that assumed in the FTR allocation, then the RTO might not have enough congestion revenues to fund all of the FTRs at their full hedging value. In that event, the hedges would either be partially funded or the revenue deficit would need to be made up from some other funding source.

The grid capability is usually highest when there are no grid outages; that is, when all elements of the grid are fully operational; grid failures tend to reduce grid capability. When maintenance requires some elements to be taken out of service, or when grid elements fail, the grid capability can be less, and fewer transactions can be supported. With fewer transactions resulting from a diminished grid, congestion revenues can also decrease, resulting in a revenue deficiency when the RTO attempts to fund the FTR hedges (the FTRs must still be settled).

Given this market design, a performance-based incentive could be fashioned to encourage efficient levels of maintenance by an ITC (or any grid owner). In a balanced performance incentive, the ITC could be rewarded by a higher return if it met superior maintenance targets and be penalized if it met a lower maintenance target. The "penalty" in this case would include the ITC's obligation to fund the outstanding FTRs in the event that grid failures that were attributable to the ITC[14] resulted in the RTO settlements collecting insufficient congestion revenues to fully fund the FTRs.

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[13] In the Northeast LMP-based markets, the ISO uses a simultaneous feasibility test to ensure that the set of FTRs it allocates can be fully accommodated by the grid. If the test is met, then the RTO will typically collect sufficient congestion rents to pay the FTR hedges, even if the actual dispatch differs from that assumed in the FTR allocation.

[14] So-called "acts of God," such as extreme ice storms that brought down major lines, would fall outside the scope of the incentive, and there would have to be limits on an ITC's liability exposure in the event of catastrophic failures. In designing the incentive, regulators would also face the familiar but complex problems of allocating liability under conditions of joint causality, such as when simultaneous line

This approach would give an ITC a market-driven incentive to perform grid maintenance at times and in ways that would minimize the impact on congestion costs. If it were required to perform maintenance during periods of heavy usage and high congestion costs, the ITC would have an incentive to minimize the duration or impact of any maintenance outage (e.g., through double shifts, etc.) or possibly conduct "live-wire" maintenance. In any case, it would be encouraged to make business judgements and tradeoffs with maintenance practices and expenditures that would increase its chances of meeting positive maintenance goals and decrease its exposure to the "penalty" of having to fund FTR revenue shortfalls resulting from grid outages.

Furthermore, the use of FTRs and the associated funding requirements would provide a market compatible means of defining the performance standard for transmission wire companies. In effect, rather than focusing on the inputs, such as the number of hours of availability of equipment, attention would turn to the outputs. Typically when the outputs are considered, the immediate attention is on the cost of power actually delivered under changing demand conditions. However, performance standards defined by power costs would be poorly matched with the assets under the grid owner's control. By contrast, here we would be able to define transmission company output in terms of maintaining FTR funding. This would create an output measure that both met legitimate customer interests and concentrated on the actions – cost-effective maintenance practices -- that the ITC could control. Hence, the standard market design would allow for the development of meaningful and consistent performance standards to accompany both market-based and regulated investments.

The incentive would thus support the market and the market's need for reliable congestion hedges and a well-maintained grid. It would encourage the ITC management to be creative and efficient in how it planned and managed maintenance practices, while allowing management to explore tradeoffs between alternative maintenance practices, expenditures, rewards and penalties. And it would be symmetrical in the use of both financial rewards for superior performance and the real risk of financial penalties for poor performance.[15]

It seems likely that other performance-based incentives could be designed for the ITC.[16] The important point is that incentives for superior ITC performance regarding grid expansion and availability can be established without requiring the ITC to be the RTO or assume its functions. And because an ITC would not run the market, performance incentives could allow an ITC to explore tradeoffs in its efforts to achieve

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failures in different, but interconnected systems (and owned by different owners) contributed to FTR funding shortages.

[15] FERC held recently that the absence of a symmetrical system of rewards and penalties may disqualify an owner from receiving incentive payments. See, FERC's "Order on Transmission Incentive Pilot," in New England Power Pool, Docket No. ER01-2922-000, issued October 25, 2001.

[16] Several market-based incentive concepts for an ITC were put forward by Commonwealth Edison in its "Petition for Declaratory Order," Docket No. EL00-25-000, filed with FERC on December 13, 1999.

rewards and avoid penalties without inviting the ITC to trade off the public goods of market fairness and efficiency in pursuit of its own private interests.

The Alternative Transco Model

Early RTO debates centered on the presumed differences between an ISO and a "pure" Transco. Here we define a pure Transco as a transmission company that owns all of the transmission within an RTO and also operates the system. As the RTO, the Transco would have responsibility over all of the functions that FERC's Order 2000 has assigned to the RTO. For example, the Transco would control the operation of the grid, ensure non-discriminatory access to the grid, and coordinate the dispatch that is used to maintain system balance, manage congestion and ensure reliable operations. In a market setting, the dispatch is also the mechanism by which the system operator provides a bid-based spot/balancing market for energy and transmission and by which it offers a market-based redispatch to manage congestion. Thus, the pure Transco model means that the grid owner would also be the coordinator of the RTO short-run markets for balancing and congestion management, two of the more important market support functions required by Order 2000.

As the RTO, the Transco would also be responsible for operating markets to auction transmission rights and to define their hedging value in the RTO settlements. It would define Available Transmission Capability and define the rules for scheduling and allocating grid access. It would coordinate transmission planning for the RTO region. As RTO system operator, the Transco would also be responsible for coordinating any markets to procure ancillary services, such as regulation and operating reserves. These markets must necessarily be coordinated with the system operator's dispatch and associated balancing and congestion management markets.

Arguments in favor of the Transco model tend to describe its merits from the point of view of the grid owner rather than that of the market operator. For example, one argument is that a stand-alone transmission business may not be a viable enterprise unless the business also has complete control over how its assets are managed and operated. Separating control of operations from ownership is thus seen as undermining the potential for a successful transmission business. If this argument were correct, it would seem to follow that operation of the grid must be controlled in a manner that facilitates or enhances the profit opportunities of the grid owner, implying that operating the grid in an impartial manner is not necessarily in the Transco's interests. We return to the implications of this argument later.

A second argument is that grid and associated system operations, including the essential dispatch service, naturally belong with the grid owner, even if "market operations" must be separated and performed independently by a disinterested third party. A version of this recurring argument first appeared in California, where the designers sought to separate grid operations (in the ISO) from market operations (in the Power Exchange). In the California design, this principle of "market separation" was viewed as one of the fundamental "pillars," thought by some to be necessary to prevent the grid operator (ISO) from operating the market. However, the consequence of separating the California ISO's reliability function from the markets that should support it served only to undermine the efficiency of both.

The problem, now better understood, is that system operations and the markets for imbalances and congestion flow from exactly the same bid-based dispatch. In other words, system operations and market operations are inseparable in the very short-run time frame in which grid use must be coordinated by a central operator to maintain reliability.[17] That is why every market has a system/market operator. In the Transco context, this means that an RTO cannot function well if one entity – the Transco – maintains control over system operations, while another entity – e.g., an independent market operator (IMO) – attempts to operate a real-time balancing and congestion management market.

A third argument is that the grid owner must be able to define who gets access to its facilities, and the conditions (and prices) under which they get access, to have a viable transmission business. But successful grid owners continue to exist in the Northeast even though the ISOs control the operation of the grid and define the rules for access to ensure non-discrimination and efficient allocation. Moreover, it is not possible to have the ISO/RTO, as the system and market operator, defining the dispatch rules, which in turn define who gets access to the grid, and simultaneously have the grid owners applying a different set of rules for deciding who gets access to the same grid. Only one set of access rules can apply to each grid at any moment, or there would be chaos and possibly catastrophic grid failure. Again, that is why system operations are *always* centralized.

There has been confusion about the requirements for creation of an independent transmission company that did not have responsibility for system and market operations (sometimes called a Gridco) and an ITC that did have responsibility for such operations (defined here as a Transco). There is no doubt that we can have ITCs as Gridcos and that they are compatible with a separate and independently governed RTO. Their business objectives would be consistent with and complement the efficient market designs emerging as the standard in the Eastern United States, so this ITC model could well be an enduring institution, perhaps the end-state. The ITC-as-Gridco would need some other entity to perform the functions of an independent system/market operator, and this could be an independent RTO modeled on the successful ISOs. There is nothing complicated about this: we know how to design these institutions, and their ISO predecessors have a successful track record wherever the markets are well designed with the features described in the previous sections.

The superficial argument has been that the Transco must have control over its operating decisions, so that it can make tradeoffs between investments and operations as driven by a high-powered regulatory incentive system. However, this argument has many implications for other market participants and for unbiased system and market operations.

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[17] Hogan, William, "A Wholesale Pool Spot Market Must Be Administered by the Independent System Operator: Avoiding the Separation Fallacy," *The Electricity Journal*, December 1995, pp. 26-37.

At the very least, the argument implies that if given the choice between operating decisions that favor the Transco interests but potentially harm the market and operating decisions that favor the market but potentially harm the Transco, the choice would be to protect the Transco. From this it would also follow that the manner in which the RTO/Transco operated the balancing/spot markets for energy and transmission, and more particularly, the manner in which it operated the markets to manage and price congestion, and the manner in which it defined and allocated transmission hedges would need to be subservient to the Transco's business interests. In short, market operations would need to support the Transco's interests in pursuing profitable investment opportunities and regulatory incentives, rather than structuring the latter to serve the interests in an efficient market. We would have the market structure backwards.

If the argument that controlling operations is essential to Transco success does reflect the intent behind the Transco, then many other things will follow. First, this would have to be a real monopoly or else any remaining Gridcos (let alone independent merchant developers) would never be on an equal footing. In other words, if it were true that a transmission company must control system and market operations throughout the region to be a successful business, then there can only be one successful grid owner for any given RTO or market region. However, there is no logical or economic reason for this to be true.[18] Experience with multiple owners in successful ISO regions would appear to invalidate the underlying assumption. Of course, if there are legitimate economies of scale available from further consolidation of ownership, and no countervailing factors, such consolidation could be accommodated within the ITC-as-Gridco framework without imposing a monopoly structure on all other existing grid owners and merchant developers.[19]

Second, it is very difficult for regulators to design incentives that properly align the Transco's interests with the public interests. This difficulty would be compounded because the Transco would want the flexibility to make tradeoffs across market operations, system control, grid maintenance, market access and grid investments. A proper incentive structure that sought to accommodate this flexibility would need to ensure that the range of possible tradeoffs did not undermine market efficiency or encourage unfairness to market participants. In the negotiations over incentive designs and targets, the Transco monopoly would have a substantial advantage in information and expertise about grid operations, while the regulator might gain vital information on inappropriate tradeoffs only after the fact, following participant complaints and lengthy investigations. If incentive regulation to achieve truly efficient outcomes were a simple

[18] It is not clear how government-owned transmission could be accommodated in this framework. Either it would have to be divested to the Transco monopoly or excluded from the RTO.

[19] It might also be argued that a single grid owner within a region would eliminate rate "pancaking" across the region. While this is possible, it misses the point. Rate pancaking is a function of attempting to collect the fixed costs of the system through charges on transactions rather than viewing these fixed costs as sunk and more appropriately recovered from the customers for whom the existing systems were built. The point is that the elimination of rate pancaking can be achieved without imposing a monopoly on regional grid ownership.

matter in the electricity industry, there might never have been a move to introduce competition and markets in the first place.[20]

Nevertheless, if the Transco-as-RTO model were attempted, regulators would be obliged to try to make incentives work, and they would be further obliged to preserve the monopoly to give the incentives a chance to work. In the end, competing generators and merchants would eventually demand protection from abuse by the protected Transco monopoly. For example, we could expect demands for radical changes in the market design, intended to give the generators something like a property right to an unconstrained grid, with Transco responsible for paying them off when this was not possible. This is the design choice that has been implemented in England and Wales.

In the U.K system, the more or less pure Transco operates the system and profits by embracing a very different market design from the design that has worked well in the Eastern U.S. Under the U.K. system, there is no efficient congestion pricing using LMP and no open spot market. Parties buying energy at a location pay a different price than parties selling energy at the same location receive, effectively precluding any coordinated real-time spot market. There are administratively defined penalties for imbalances in lieu of market-clearing prices, a feature that is already discouraging new entry by smaller players and intermittent resources. Access to the grid is not allocated based on willingness to pay the marginal cost of redispatch, as it is in PJM and New York. Instead, the grid owner/operator, National Grid Company (NGC), manages congestion not by paying and charging locational marginal prices but rather by buying generators on or off the grid when it cannot meet the implicit goal of an unrestricted grid. Because it cannot rely on locational market prices to encourage appropriate generator siting, NGC must use administratively defined rewards and penalties to signal generators where to locate new plants so as not to exacerbate congestion (or undermine NGC's incentive payments for reducing congestion costs). And because the absence of LMP congestion pricing and LMP-based property rights eliminates any possibility for market-driven incentives for grid enhancements, the NGC monopoly must rely solely on incentive rates defined by the British regulator to induce the grid enhancements that reduce congestion uplift costs to levels deemed acceptable by the regulators.

RTOs in the US must of course meet the market support requirements of Order 2000, but the examples of Transcos proposed in the US typically give only qualified support for efficient market designs, making them conditional or secondary to the higher business interests of the Transco. Transco-based RTO proposals have too often been characterized by ambiguously defined transmission rights and implicit opposition to open spot markets. This is usually in the guise of explicit opposition to an undefined "power

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[20] An independent, non-Transco RTO would also need incentives to encourage efficient operations. While the design of these incentives is not simple, it should be simpler than the regulator's tasks in aligning Transco interests with public interests. In the non-Transco RTO, incentives could be narrowly targeted at the more limited functions of the RTO, such as achieving an efficient dispatch, minimizing spot market pricing errors, and so on. The Eastern ISOs pursue these goals through employee compensation incentives designed by ISO management and approved by the independent ISO boards.

exchange" and accompanied (and probably dictated) by an unwillingness to use marginal costs and market-clearing prices in settlements for imbalances or congestion charges.

These features indicate that the real issues raised by the Transco model are its implications for market design. And the choice between the ISO/RTO model and the Transco-as-RTO model centers on the rules that would apply. In the end, therefore, all the theory and expensive experience underlying the evolution of the RTO concept points to the same results in the need for the critical functions to be separated from the discretionary control of the transmission owner.

Hybrid Transco Models

Faced with these obstacles, the U.S. discussion of Transcos almost always leads quickly to hybrid models that downplay or discard the monopoly aspect and then separate the Transco from performance of the market functions, to address the issues of bias and independence. A hybrid concept may even accept that there must be some features of a standard market design, such as a bid-based dispatch and associated imbalance market (if not an open spot market) with some form of locational congestion pricing. Further, independence requires that the dispatcher has to follow these design rules and not change them to suit the needs of the Transco. To meet FERC's RTO requirements, independence for the RTO's system/market operations must be created by some kind of fencing off of the Independent Market Operator (IMO) from the control and interests of the Transco, though how this can be accomplished and verified has not been specified. Having the IMO under the Transco and subject to the Transco's board would not appear to be sufficient.

Various forms of this "Transco-plus-IMO" hybrid have been proposed. For example, a version appeared in the Southeast RTO mediation, and for good reason. It attracted support as a possible way to address the difficult problems of independence. Outside the U.S., a type of hybrid appears in New Zealand, where Transpower is the Transco and one of its divisions performs the IMO/ISO role, but Transpower cannot make unilateral changes in the dispatch and pricing rules under which its IMO/ISO functions.[21] Furthermore, Transpower is not strictly a for-profit entity; as a government corporation, it has an explicit mandate to operate in the public interest.

How the hybrid Transco-plus-IMO would actually function under Order 2000 has yet to be defined, as proponents have still not confronted the implications of the need to separate the Transco's ownership/investment interests from the IMO's system/market operations. If these rules were fully specified to the level needed to resolve the independence concerns, we might well find that the distinctions between the Gridco-plus-ISO model for an RTO and the Transco-plus-IMO model are few in reality and are limited to things like sharing overhead costs for office space and services. At the very

[21] Transpower is responsible for bid-based dispatch, coordination of ancillary services and determination of spot prices using locational marginal pricing. A separate organization handles market settlements using inputs from the Transpower IMO/ISO.

least, however, there would appear to be a greater role for codes of conduct and regulatory supervision in the Transco-plus-IMO model in order to preserve the independence of market operations and to prevent preferential access to IMO information. In addressing the governance issue, the distinction between having the IMO subject to a truly independent RTO board, rather than subject to the Transco, would be critical. Governance would need to avoid both the reality and the perception that the IMO's market operations could become biased in favor of the Transco's business interests, particularly in cases where competing investments for the same market value could be pursued by generators or independent merchant investors.

The implication of this chain of logic is that in the end the Transco cannot really have discretionary control over the market design and the rules for dispatch and pricing. The private business interests of the Transco are legitimate, but these interests require that the rules of market design be set and maintained independently and in the public interest.

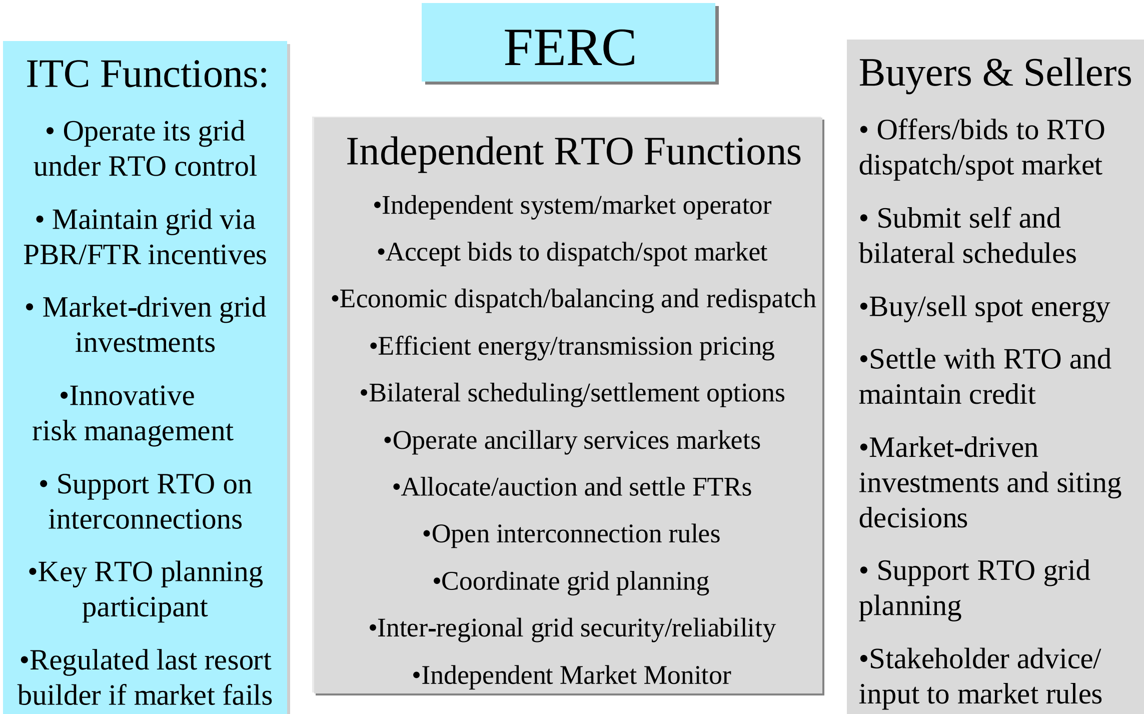
Furthermore, a Transco-based RTO could not have market rules different from those of other RTOs. If FERC were to accept an RTO modeled on the Transco-plus-IMO concept, its market design, dispatch and pricing rules and associated software specifications would need to be more or less identical to the designs, rules and software specifications used by an RTO modeled on a Gridco-plus-ISO concept. All the arguments for a standard market design to enable a robust inter-regional market across different RTOs would apply, irrespective of the structure of grid ownership. Indeed, if the hybrid Transco argued that its RTO's rules must be different, it would imply that the Transco-plus-IMO concept can only succeed with market designs, dispatch and pricing rules that were deliberately compromised to favor the Transco's private interests.

The Way Forward

A model ITC could satisfy the reasonable desires for a for-profit, transmission business that would be compatible with the successful market designs emerging in the Eastern United States. Its functions and motivations complement those designs and take advantage of the opportunities for market-driven investments presented by coordinated spot markets, pricing transmission usage with LMP and awarding FTRs. There would be no need for a single Transco. By leaving the public interest functions to an independent RTO, the ITC and other parties would be free to pursue these investments vigorously without concern that any grid owner's private interests would undermine the market's need for an unbiased system/market operator. And by uncoupling grid ownership from RTO design, we would substantially simplify the tasks of governing the RTO and ensuring unbiased market operations, while facilitating the emergence of ITCs that functioned as effective competitors in the market to capture the value of relieving congestion. A logical split between ITC and RTO functions would then be apparent.

Figure 1

An ITC Complements the Market But Doesn't Run It
The RTO Remains Independent



It may be that the Transco debate has served a useful function in highlighting the need for a viable transmission business model that can address the need for further grid investments. However, the drawbacks of the pure Transco model are apparent, and the ITC concept described here meets the major objectives of the for-profit Transco concept. Aside from its fundamental compatibility with efficient market designs, the ITC's focus on market-driven investments as a primary means to address the grid investment issue offers FERC a task far simpler than the one it would face from a model primarily dependent on carefully crafted regulatory incentives to cover the entirety of Transco operations. It seems unlikely that FERC would be prepared to provide the integrated resource planning framework that would be necessary to balance the need for grid investments, new generator entry and new demand-side investments. Yet that is probably what would be required if FERC had to rely primarily on regulatory incentives rather than market prices to support an efficient market infrastructure.

It is worth recalling that FERC undertook the important policy initiatives in Order 2000 for the purpose of creating robust, competitive regional markets, not to define the appropriate structure for grid ownership. In that sense, the Transco debate has been a distraction, with the unavoidable arguments about Transco governance and independence delaying a much needed focus and resolution on the issues of market design, market structure (and market power) and supply adequacy. It is not surprising, therefore, that

FERC has now refocused on the need to standardize a workable design at the same time that it has raised questions about the wisdom of entangling market rules and market operations with the structure of grid ownership.

In the task of structuring RTOs, market design and pricing rules are paramount. If FERC gets these features right, particularly the rules for efficient pricing and transmission rights, the market will have a chance to drive investment decisions. If we then allow form to follow function, RTO governance will then become properly focused on what it takes to support the public interest in an efficient, workable market and reliable operations. And the ITC model will then be available to help answer the issues of grid investment and grid ownership within a more logical, consistent and supportive framework. The essential task is therefore to define and implement the standard market design, with its coordinated spot markets, efficient pricing rules and financial property rights, and then allow market-compatible ITCs to emerge.

Appendix
Market Design Principles to Support Market-Driven Investments[22]

The foundation for the RTO's spot/balancing and congestion management markets is a bid-based, security-constrained, economic dispatch. This same dispatch provides both system balancing and redispatch to relieve congestion and maintain flows within all security constraints.[23] The dispatch is coordinated on a regional basis by the RTO, usually in coordination with local control centers. In addition to a bid-based real-time balancing/spot market, the RTO may also operate bid-based day-ahead (and/or hour-ahead) markets in which parties can buy and sell energy and transmission, settle and reconfigure financial transmission rights, and lock in day-ahead prices for energy and transmission that reflect the effects of congestion. Settlements for these various markets are then based on nodal pricing (locational marginal pricing).

Nodal locational marginal prices are defined as the incremental cost in the dispatch of serving an increment (1 MW) of load at each location, given the actual dispatch, the constraints affecting that dispatch, and the offers and bids submitted to the RTO for use in the dispatch. After arranging the dispatch, the RTO can calculate the nodal prices at each location on the grid and use these prices to settle spot energy purchases and sales and bilateral schedule imbalances at each location.[24]

Because RTO settlements are based on marginal costs, concerns about "leaning on the system" or "underscheduling" do not arise as they do in other market designs. Instead, parties are left free to use the spot/imbalance market as needed without administrative penalties. The market can then sort out the balance between forward bilateral contracting and bid-based spot market use based solely on commercial considerations rather than administrative restrictions and reliability concerns. In other words, since the locational marginal prices are consistent with a security-constrained dispatch – a dispatch that relieves congestion while keeping the system in balance – market responses to these prices will tend to support, rather than undermine reliability. Market-based prices for imbalances and spot transactions thus encourage generators to operate in ways that are consistent with the dispatch and the RTO's efforts to relieve congestion and maintain system reliability.

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[22] The elements described here are more fully explained in Chandley, John, "Foundation Principles for a Standard Market Design," *Electricity Journal*, December 2001, pp. 27–53 and in related papers available at http://www.ksg.harvard.edu/hepg/Standard_Mkt_dsgn/.

[23] The fact that both real-time balancing and congestion management arise from the same dispatch is important, because it is sometimes ignored in market design debates that assume that the two functions can be separated and possibly performed by separate entities. In the successful ISO markets, they are performed as a single integrated function, and at the least cost, given the available offers and bids from participants.

[24] In the Eastern markets, the PJM and NY ISOs calculate and post the nodal prices on their respective web sites every five minutes, providing transparent and virtually real-time prices to the market. The ISOs also calculate weighted averages of aggregations of nodal prices to define trading hubs to facilitate liquid trading and "load zones" for retail pricing.

Locational differences in nodal prices are also used to define transmission usage charges for point-to-point transactions that are scheduled with the RTO. The usage charge is defined by the amount of the transaction (in MW) times the difference between the nodal price at the point of delivery and the nodal price at the point of receipt.[25] The usage charge also equals the marginal cost of redispatching the system to accommodate each transaction. Parties scheduling transactions with the RTO thus pay usage charges that accurately reflect the impact of their flows on the grid. This allows the RTO to allocate the grid efficiently based on the willingness of potential grid users to pay the marginal cost of the dispatch/redispatch associated with their usage.

Nodal pricing means that each transmission user faces locational energy prices and transmission usage charges that reflect the redispatch cost of relieving congestion, but these prices cannot be known until the dispatch. Hence, a mechanism is needed to create forward financial certainty with respect to the effects of congestion on energy prices and usage charges. The Eastern markets use financial transmission rights (FTRs)[26] to provide this *ex ante* price certainty. The FTRs hedge the effects of congestion on spot energy and transmission prices, with the locational difference in nodal prices for the points defined by each FTR defining the value of the hedges. Market participants can acquire FTRs in annual or monthly auctions or through secondary trading with other FTR owners. Because FTRs can be readily traded and are settled for cash during each RTO settlement period (e.g., each hour), they function as liquid property rights for those who acquire, hold or sell them.

A participant's willingness to pay for an FTR between any two locations will be driven by the expected differences in nodal prices – that is, by the expected costs of congestion between the two locations. In PJM, New York and New England, and as proposed for the Midwest ISO, incremental FTRs will also be awarded to those who invest in transmission expansion, to the extent that the expansion allows additional FTRs that are simultaneously feasible with existing FTRs. The value of FTRs and forward prices for FTRs when acquired in RTO auctions or secondary trading supply the forward price signals and valuable property rights that become important parts of the investment incentives for grid enhancements.

The essential features of this standard market design are illustrated in Figure 2.

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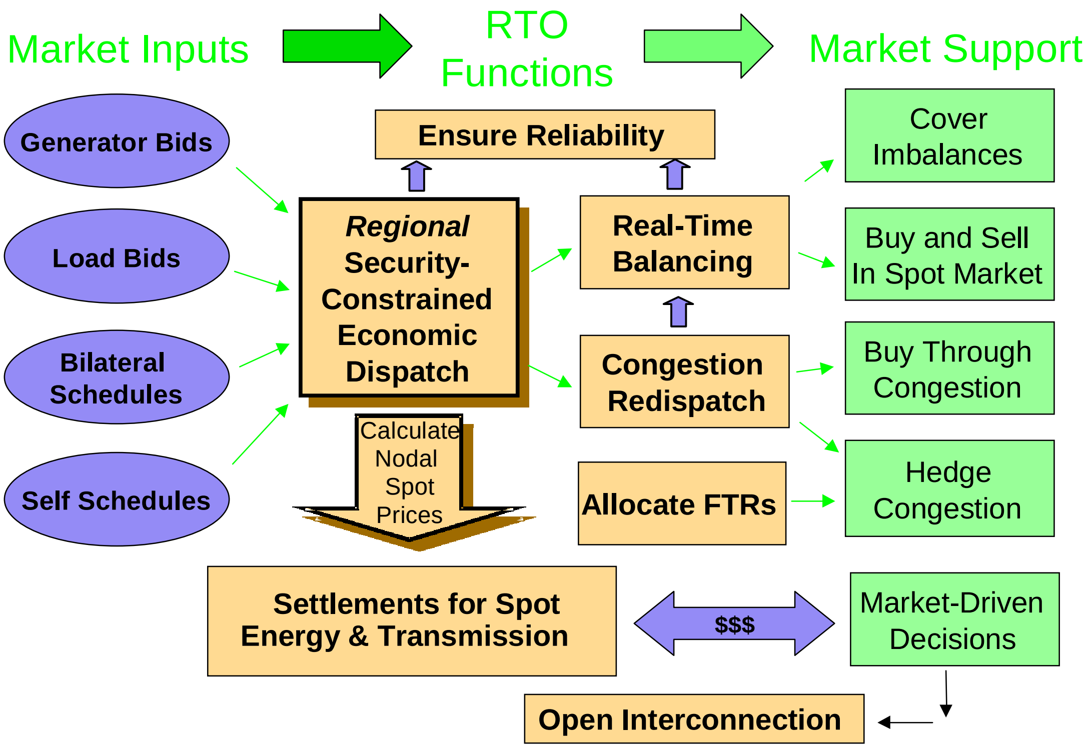
[25] This difference may be either positive or negative, depending on the direction of flows and congestion. A negative difference implies that a transaction creates "counter-flows" that help relieve the constraints and should thus be compensated by the difference in nodal prices.

[26] The term "FTR" is used generically to mean a financial transmission right that entitles the holder to receive (or perhaps pay, depending on the type of right) the difference in nodal prices between any two locations on the grid. "Fixed Transmission Rights" (as used in PJM) and "Transmission Congestion Contracts" (as used in New York) are examples of FTRs. Functionally identical instruments, called "Financial Congestion Hedges," have been proposed by the New England ISO and other emerging RTOs. These are all point-to-point financial hedges. Constraint-specific hedges, known as "flowgate" rights can also be designed as financial congestion hedges.

Figure 2

An RTO Dispatch Supports a Regional Market While Ensuring Reliable Operations



Since 1998-99, markets with these designs have been operated successfully by the ISOs in PJM and New York. An essentially identical design has been adopted and approved by FERC in conjunction with reforms of the ISO-New England markets. And the same design principles are under serious consideration for development by the Midwest ISO and other emerging RTOs in the Eastern Interconnection. During FERC's RTO conferences in mid-October, several witnesses recommended the principles that underlie these markets as the basis for a standard market design for RTOs throughout the country. Hence, it is important that a compatible and workable business model for an ITC be designed to function seamlessly with this emerging RTO market design.