A PATH TO PREVENTING UNDUE DISCRIMINATION AND PREFERENCE IN TRANSMISSION SERVICES

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Introduction

The Federal Energy Regulatory Commission proposals for Order 888 Open Access Transmission Tariff (OATT) reform arise from a continuing frustration with the Commission's efforts to provide open access to transmission both for its own sake and to support competitive markets. The Commission has found it difficult to meet the basic requirement to avoid undue discrimination and preference in transmission services. This difficulty follows in part from the nature of the electricity grid. But more important, the transmission access procedures promulgated in Order 888 are not consistent with the requirements of reliable and efficient operation of the grid, nor do they support workable competitive markets. A better approach, more closely aligned with actual grid operations and compatible with competitive principles, is obviously needed. Unfortunately, the narrow focus in the Commission's Notice of Proposed Rulemaking (NOPR)[1] does not allow it to see the problems inherent in the current Order 888 framework that must be addressed to achieve the Commission's goals.

After many prior attempts at broader reforms to meet its expansive goals for industry reforms, the Commission seeks now to narrow its scope to advancing limited

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[1] Notice of Proposed Rulemaking (NOPR), filed May 19, 2006, in Docket Nos. RM05-25-000 and RM05-17-000, *Preventing Undue Discrimination and Preference in Transmission Service*.

changes to the OATT. The focus is on improving the consistency and transparency of the determination of available transfer capability (ATC) as the primary means to address undue discrimination. But if inconsistent ATC calculations and methods are not the underlying problem, then the proposed "solutions" will fail.

The emphasis of the past analyses has been on the defects of the OATT contract path and ATC framework. Although the Commission's own analyses have recognized these defects, the Commission has not been able to address these matters without entangling itself in a larger debate about electricity market design and electricity restructuring. Given the impasse, it may be that the emphasis on ATC imposes too much on the Commission if it is to find a path to preventing undue discrimination and preference in transmission services. A different approach is needed.

An approach to the same fundamentals could be taken through consideration of balancing services and imbalance pricing for energy and generation. A focus on balancing (or dispatch) services and how they are priced would allow the Commission to avoid the pitfalls inherent in the ATC approach. It would also allow the Commission to fulfill its commitment to "comparable" transmission service for all by substantially eliminating a major difference between the way non-RTO utilities treat third parties' grid uses and how they provide service to their own native loads, more closely matching how RTOs provide the benefits of native load service to all users. This approach would thus eliminate much of the difference between how third parties are treated in RTO versus non-RTO systems. While minor regional variations might be considered, the approach would ensure that all users in the same region would be treated the same.

This change in focus could be accommodated within the current proceeding. The Commission's NOPR includes proposals for reform of balancing services and imbalance pricing, but the Commission does not explain the central importance of the issue and its intimate connection with the requirements for reliable and efficient operation of the grid. Modifying the procedures and pricing for imbalances to conform to the requirements of reliable and efficient operation of the grid would be necessary for achieving the goals of Order 888 reform. Moreover, a more principled analysis based on the nature of grid operations would guide the (limited) choices for imbalance pricing that would resolve contradictions that otherwise would require discrimination and preference in transmission service. This same approach would create natural incentives for other appropriate improvements in transmission access. This analysis would focus the Commission reform on a principled rationale for its intended move to imbalance charges based on incremental costs.

This path would define incremental costs based on the well-established framework of security-constrained, economic dispatch. Security-constrained dispatch is necessary for reliable operation of the system. Within the limits of reliability, economic dispatch is necessary for efficient operation of the system and is the presumed obligation or choice of transmission providers in serving their own needs. The only approach for providing balancing services that avoids a need for discrimination is to allow everyone to participate in the security-constrained, economic dispatch. The only approach for imbalance pricing that eliminates the need for discrimination by customer type is to use the incremental costs that follow from the real-time security-constrained economic

dispatch. As the Commission notes, this reform would provide a principled basis for addressing many related issues, such as the treatment of intermittent generation.

The Commission recently submitted to Congress a report on security-constrained economic dispatch in compliance with the mandates of the Energy Policy Act of 2005.[2] However, that report focused on the details of how to conduct a dispatch and how the dispatch is approached in different regions. The Commission's report did not explore the essential connection with the challenge of providing open access and preventing undue discrimination and preference in transmission service. To the extent that there is recognition that such a connection exists, the report defers to the present OATT review. Hence, the Commission has not examined the fundamental issue and it is proper to emphasize the connection in the OATT reform rulemaking.

Adopting security-constrained, economic dispatch as the framework for balancing services and imbalance pricing is necessary in order to eliminate undue discrimination and preference in transmission services. This change would also substantially reduce the problems inherent in the OATT reliance on the contract path and ATC for transmission service scheduling. Although this reform would be modest compared to a full embrace of the Regional Transmission Organization (RTO) model of electricity market design, efficient balancing and pricing would create incentives that should point market participants towards better market design and alternative procedures for providing transmission rights. The Commission would not need to adopt these broader reforms to

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[2] Federal Energy regulatory Commission, "Security Constrained Economic Dispatch: Definition, Practices, Issues and Recommendations," A Report to Congress Regarding the Recommendations of Regional Joint Boards For The Study of Economic Dispatch Pursuant to Section 223 of the Federal Power Act As Added by Section 1298 of the Energy Policy Act of 2005," July 31, 2006.

achieve its more limited objectives, but eliminating a fundamental inconsistency between the OATT rules and actual operation of the grid would remove a major obstacle to other reforms.

Furthermore, the Commission could achieve these benefits within the scope of the current NOPR and without making compromises on the principle of eliminating undue discrimination and preference in transmission services. To the contrary, any other approach would necessarily require the Commission to approve methods and approaches that codify such discrimination and preference.

What is the Commission Proposing, and Why?

The NOPR states that the Commission's proposed reforms are "intended to address deficiencies in the *pro forma* OATT that have become apparent since 1996 and to facilitate improved planning and operation of transmission facilities."[3] At its core, the continued debate identifies persistent disagreement about what open access means, and what models are available to achieve the purported benefits. In presenting the NOPR, the Chairman summarized the repeated attempts to address the problem:

> "The first time the Commission found Order No. 888 allowed undue discrimination and preference in transmission service occurred in 1999. The solution advanced by the Commission was restructuring: encouraging voluntary RTO formation, in Order No. 2000. … The second time the Commission found Order No. 888 allowed undue discrimination and preference took place in 2002. The solution advanced by the Commission at the time was also restructuring, this time mandating RTO participation and a standard market design. … The solution we advance today is not restructuring, but more effective regulation, reform of the open access rules themselves, for the first time in nearly a decade."[4]

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[3] NOPR at 3.

[4] Statement of Joseph Kelliher, Chairman, Federal Energy Regulatory Commission, Regarding Open Access Transmission Tariff (OATT) Reform (RM05-25-00), May 16, 2006.

More specifically, the NOPR states that,

> "As a general matter, the purpose of this rulemaking is to strengthen the *pro forma* OATT to ensure that it achieves its original purpose – remedying undue discrimination – not to create new market structures. We propose to achieve this goal by increasing the clarity and transparency of the rules applicable to the planning and use of the transmission system and by addressing ambiguities and the lack of sufficient detail in several important areas of the *pro forma* OATT. The lack of specificity in the pro forma OATT creates opportunities for undue discrimination as well as making the undue discrimination that does occur more difficult to detect."[5]

Having concluded that the reason Order 888 continues to permit undue discrimination stems from "ambiguities," the need for "clarity and transparency" and the "lack of sufficient detail" in the current *pro forma* OATT, the Commission's NOPR then summarizes its proposed remedies that would logically flow from its analysis of the current problems:

> "First, we propose to improve transparency and consistency in several critical areas, such as the calculation of available transfer capability (ATC). We propose to direct public utilities, under the auspices of the North American Electric Reliability Council (NERC) and the North American Energy Standards Board (NAESB), to provide for greater consistency in ATC calculation. . . .
>
> Second we propose to reform the transmission planning requirements of the *pro forma* OATT to eliminate potential undue discrimination and support the construction of adequate transmission facilities to meet the needs of all load-serving entities. The *pro forma* OATT contains only minimal requirements regarding transmission planning, which have proven to be inadequate as the Nation faces inadequate transmission investment in many areas.

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[5] NOPR at 3.

> Third, we propose to remedy certain portions of the *pro forma* OATT that may have permitted utilities to discriminate against new merchant generation, including intermittent generation. For example, we propose to modify the energy imbalance provisions of the pro forma OATT and adopt certain other tariff modifications.
>
> Fourth, we provide for greater transparency in the provision of transmission service to allow transmission customers better access to information to make their resource procurement and investment decisions, as well as to increase our ability to detect any remaining incidents of undue discrimination.
>
> Finally, we provide for reform and greater clarity in areas that have generated recurring disputes over the past 10 years, such as rollover rights, "redirects," and generation redispatch."[6]

Importantly, the Commission emphasizes that it is not abandoning several principles that support the goal of eliminating undue discrimination. The Commission would retain "the comparability requirement under which each public utility must treat third parties in a manner comparable to its service to bundled customers." This continues the "golden rule" enunciated in Order 888 of providing comparable service to all as the essence of non-discrimination.

In addition, the Commission would retain the concepts of network and point to point service; retain the "protection of native load customers," so that load serving entities can "provide transmission rights to meet their service obligations;" and continue to limit its jurisdiction to unbundled transmission service, not bundled retail service, while still requiring "functional [rather than corporate] unbundling to address undue discrimination." And finally, the Commission continues to view the OATT as a means to "facilitate the development of competitive wholesale markets by reducing barriers to

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[6] NOPR at 4-5.

entry through the control of transmission assets, not imposing any particular market structure on the industry."[7]

These are not only worthwhile goals, but also goals the Commission can achieve it if understands the problems that must be overcome and applies a realistic framework in designing solutions. Indeed, workable solutions are already at hand and have been successfully implemented in large parts of the country. But there is a serious problem standing in the way before this progress can be expanded to other regions.

What's Wrong with this Picture? And Why Will the Commission's Proposals Fail to Achieve It's Goals?

The Commission's stated goals are worthwhile, and happily there are successful examples of how to achieve them. Unfortunately, the NOPR's proposed remedies cannot achieve these objectives, because the Commission's analyses do not reflect the realities of how the grid operates and how transmission service is actually provided. The fundamental weakness of the Commission's framework is that it misidentifies the reasons why undue discrimination continues under Order 888. Identifying the wrong reasons for discrimination then leads inexorably down false paths towards dead end "solutions" that cannot solve the problem.

It is simply not true, either in theory or in practice, that the source of continuing discrimination is a fundamental lack of "clarity and transparency" under Order 888 that permits inconsistencies in the calculation of ATC. There are undoubtedly inconsistencies in the way transmission providers calculate ATC. But it would be a mistake to assume

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[7] NOPR at 5-6.

that these inconsistencies arise primarily from deliberate attempts to discriminate or that eliminating inconsistencies would preclude undue discrimination in transmission access. Rather the difficulties follow inexorably from the demonstrably false premise that there is a definable amount of ATC that can be calculated independent of the actual use of the grid.

The Commission has been repeatedly reminded by industry comments and its own analyses that the grid's transmission capacity is not a static number that can be calculated *ex ante*; it depends entirely on how the grid is used in real time. In particular, it is not possible to determine ATC and then subsequently decide on how to schedule and use the transmission system. Hence, the ATC concept envisioned in Order 888 is not amenable to either transparency or consistency and still support reliable and efficient use of the transmission grid. Of course, the Commission could impose an arbitrary rule that would be transparent and consistent across customer types. But the rule would necessarily be arbitrary and would not be consistent with actual operation of the grid.

The Commission undertook a major task in Order 888. The purpose was to remove impediments to competition in the wholesale electricity bulk power market. A critical impediment is access to the integrated transmission system under terms and conditions that would avoid undue discrimination. As stated in Order 888:

> "Today the Commission issues three final, interrelated rules designed to remove impediments to competition in the wholesale bulk power marketplace. . . .The legal and policy cornerstone of these rules is to remedy undue discrimination in access to the monopoly owned transmission wires that control whether and to whom electricity can be transported in interstate commerce."[8]

[8] Order 888, April 24, 1996, p. 1.

The idea is simple in concept. The technology for electricity systems implies that there is only one interconnected transmission grid over very large geographic, economic and political regions. It would be neither practical nor desirable for competitors to duplicate this grid. Hence, access for all parties to use the same grid without undue discrimination must be a cornerstone of policy. The goal, therefore, is important and essential.

The core problem arises from the inherent nature of the electricity transmission grid. As the Commission explained at length in Order 888, the interconnected grid produces strong physical interactions among all sources and uses of power.[9] The "transportation" process between source and destination is not like that presumed for other controllable networks with a simple "path" that can be assigned for the transaction. To a first approximation, the actual flow of power disperses across every possible path in the proportions required to equalize the marginal impedance across all paths. As the Commission stated:

> "A contract path is simply a path that can be designated to form a single continuous electrical path between the parties to an agreement. Because of the laws of physics, it is unlikely that the actual power flow will follow that contract path. … Flow-based pricing or contracting would be designed to account for the actual power flows on a transmission system. It would take into account the "unscheduled flows" that occur under a contract path regime."[10]

This observation has extensive implications. For example, because of these parallel flows it follows that every transaction has some impact on every constraint in the

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[9] Order 888, pp. 92-98.

[10] Order 888, April 24, 1996, footnotes 184-185, p. 93.

interconnected grid. These impacts can be so substantial that it is not possible to define or calculate the transmission capacity between locations without also specifying how the grid is used in other locations. This fact is not news to the Commission, and many parties contributing to the discussion leading to Order 888 and the associated Real Time Information Network (RIN) made this point. For example, consider:

> "A primary purpose of the RIN is for users to learn what Available Transmission Capacity (ATC) may be available for their use. Because of effects of ongoing and changing transactions, changes in system conditions, loop flows, unforeseen outages, etc., ATC is not capable of precise determination or definition."[11]

However, at the core of the Commission's contract path approach in Order 888 is the idea that ATC can be defined, calculated and allocated in advance so that the participants can make decisions on how to use the network. But if ATC is not capable of precise determination or definition, the contract path cannot be the tool for evaluating or allocating use of the grid.

This inherent circularity in the definition of the contract path model for ATC is not unique to the Commission's approach or to the United States. It is a fundamental property of the current technology for electric power transmission grids. The same problems faced by the Commission appear throughout the world, and appeals to the contract path approximation fail for the same reasons. For example, in a desire to "simplify" the rules for transaction between countries, the European Union has been trying to resolve the contradictions of the contract path definition. However, the contradiction is fundamental and it does not go away, as summarized without the usual

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[11] Comments of the Members of the PJM Interconnection, Request for Comments Regarding Real-Time Information Networks, Docket No. RM95-9-000, FERC, July 5, 1995, p. 8.

circumlocutions in a discussion of the European Transmission System Operators (ETSO) attempts to define the equivalent of ATC:

> "Does the draft Regulation set the right objective when it requires TSOs to compute and publish transfer capacities? ETSO says both yes and no …in many cases the (Net transfer capacity or NTCs) may be a somewhat ambiguous information…The core of the difficulty raised by transfer capacities lies in the fact that they do not obey usual arithmetic: 'it makes no sense to add or subtract the NTC values…' Put it in other ways, in order to compute the maximal use of the network, one needs to make assumptions on the use of the network! This definition is restated and elaborated in ETSO (2001a) (p. 6)."[12]

The same issues arise in every interconnected transmission grid. Despite the discomfort of its implications, the basic fact is persistent and pervasive. The central problem with the contract path model and the associated ATC is that they are fictions. The gap between the administrative fiction and grid reality is material and the actual ability to move power between two locations can vary from a great deal to zero, depending on the configuration of other sources and uses at different locations. This substantial gap between the fiction and the reality allows, sometimes even requires, the transmission provider to exercise undue discrimination.

In a request for comments on issues related to the problems with ATC calculations, the Commission noted that there were many difficulties that inhibited open access. However, the Commission argued that a principal problem was a lack of standardization that left too much room for discrimination.

> "Transmission providers have incentives to understate ATC on those paths valuable to power sellers that are competitors to a transmission provider's own (or

[12] J. Boucher and Y. Smeers, "Towards a Common European Electricity Market--Paths in the Right Direction…Still Far From an Effective Design," Belgium. September, 2001, pp. 30-31. (see HEPG web page, Harvard University).

> its affiliate's) power sales. The lack of clear and consistent methodologies for calculating ATC can allow transmission providers the discretion to control the transmission system to favor their own power sales or those of their affiliates. ATC can vary considerably depending on the criteria they use to calculate it and the order in which the calculations are made. Although the Commission has required transmission providers to post the formula for calculating ATC, the transmission provider has sole responsibility for, and a great deal of discretion in, its calculation. More rigorous and consistent standards and procedures for ATC calculations would help ensure that transmission providers' exercise of discretion in their calculation of ATC does not result in undue discrimination with respect to interstate transmission."[13]

This focus on standardization makes an implicit assumption that there is a possible standardized definition that would meet the Commission's objectives. If there were such a possibility, then standardization would have merit. But if the basic idea is without foundation, then standardization is an illusion.

The more fundamental point was addressed in the North American Electric Reliability Council (NERC) Long-Term AFC/ATC Task Force Report that the Commission cited as a principal source of its analysis. In particular:

> "The Transfer Capability between two areas is typically assessed or determined by modeling a generation excess in the "from" area at a specific source point(s) and a generation deficiency in the "to" area at a specific sink point(s). The increased source level at which the loading on a transmission element is at its normal rating (with no contingencies) or its emergency rating (with an outage of a generation unit or a transmission element) is be defined as the incremental Transfer Capability.
>
> Selection of the specific source and sink points will impact the calculated 'power transfer distribution factors' and various transmission facility loadings to determine the AFC/ATC values and to determine the anticipated impact of a Transmission Service Request on specific Flowgates. Therefore, the posted AFC/ATC, as well as the evaluation of a transmission service request, is greatly

[13] FERC, "Information Requirements for Available Transfer Capability," Notice of Inquiry, Docket No. RM05-17-000, May 27, 2005, p. 6.

> influenced by the selection of these points. Transmission service sold based on a set of source/sink points that do not correspond to the generation that moves for the schedule results in inaccurate ATC values."[14]

Hence, ATC involves far more than a general interface between two regions. The precise location of the sources and uses determine the possible incremental transfers. Symmetrically, the same observation applies to all other transactions which have to remained fix. The very concept of incremental (and hence total) transfer capability depends on establishing the pattern of use of the grid. If the ATC on the contract path is to be used to determine how to use the grid, the definition becomes fully circular. The problem is not that the calculation of ATC is not standardized. The problem is that the concept of ATC on a contract path, with the capacity determined independent of the usage of the grid, is not well defined.

In Order 888, the Commission recognized these difficulties with the contract path approach, and considered the use of alternatives that would define ATC and establish an associated pricing methodology that was consistent with the actual pattern of power flows in the grid. At the time the Commission judged the alternatives as unproven even though they had appeal. However, in an attempt to speed the move to open access the Commission adopted the contract path model and its associated pricing principles.

> "We will not, at this time, require that flow-based pricing and contracting be used in the electric industry. In reaching this conclusion, we recognize that there may be difficulties in using a traditional contract path approach in a non-discriminatory open access transmission environment, as described by Hogan and others. At the same time, however, contract path pricing and contracting is the longstanding approach used in the electric industry and it is the approach familiar

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[14] NERC, "Long-Term AFC/ATC Task Force Final Report," Revised April 14, 2005, Appendix B, p. 1.

> to all participants in the industry. To require now a dramatic overhaul of the traditional approach such as a shift to some form of flow-based pricing and contracting could severely slow, if not derail for some time, the move to open access and more competitive wholesale bulk power markets. In addition, we believe it is premature for the Commission to impose generically a new pricing regime without the benefit of any experience with such pricing. We welcome new and innovative proposals, but we will not impose them in this Rule."[15]

Much has happened since. The hope that the "longstanding approach" of the contract path model could support "a non-discriminatory open access transmission environment" has proven vain. In fact, it was the inherently "closed access" nature of the old system that hid the defects of the contract path model by preventing a significant volume of third-party transactions.

Evidence of the immediate seriousness of the problems created by Order 888 was readily at hand. For example, shortly after the adoption of Order 888, the NERC recognized that contract-path scheduling would undermine reliability by creating incentives to overload the electricity network system. The NERC immediately adopted transmission loading relief (TLR) protocols to undo the damage whenever the system became constrained.[16] In essence, NERC created an administrative un-scheduling system to counteract the effects of the mandated contract-path scheduling system.[17] The NERC system did not work well.[18] However, something was necessary in order to keep the lights on.

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[15] Order 888, April 24, 1996, p. 96.

[16] Rajaraman, Rajesh, and Fernando L. Alvarado. 1998. "Inefficiencies of NERC's Transmission Loading Relief Procedures." Electricity Journal, October 1998, pp 47-54.

[17] Scott M. Harvey, William W. Hogan, and Susan L. Pope. "Transmission Capacity Reservations and Transmission Congestion Contracts, "Center for Business and Government, Harvard University, 1997. Available through the author's web page.

[18] NERC Market Interface Committee Congestion Management Working Group, 1999.

The Commission recognizes that the contract path model was an expedient to initiate open access:

> "In Order No. 888, the Commission stated that its use of the contract path model of power flows and embedded cost ratemaking was intended to initiate open access, but was not intended to signal a preference for contract path/embedded cost pricing for the future. The Commission further stated that it would entertain non-discriminatory tariff innovations to accommodate new pricing proposals in the future. Order No. 888 at 31,734-35. Should the Commission continue to use the contract path model in the future?"[19]

By contrast, over subsequent years several regions implemented versions of the "new and innovative proposals" the Commission anticipated. There is now extensive empirical evidence of the pervasive and consistent problems that arise when the notional transmission model deviates significantly from reality, and subsequent experience illustrates the benefits of building the open access rule on a principled foundation that reflects the critical realities of the flow of power on the grid.

How the grid is used depends on how the system is dispatched in real time by each control area's system operators. Thus, the inconvenient fact is that even if the NERC and NAEB were somehow able to define, promulgate and consistently enforce a common, transparent and detailed set of rules for calculating ATC, the ATC calculations would still be largely irrelevant, and pervasive undue discrimination in providing transmission service would necessarily persist. And it would persist for one simple reason, a reason the Commission implicitly acknowledged in its original adoption of Order 888:

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[19] Federal Energy Regulatory Commission, Notice of Inquiry on Preventing Undue Discrimination and Preference in Transmission Service, Docket No. RM05-25-000, September 16, 2005, p. 13, (emphasis in original).

The flawed structure and conceptual framework of Order 888 inherently require discrimination.

In short, it will take a different focus in the Commission's thinking to fix the deep flaws in the Order 888 framework. Improving the transparency and consistency of ATC calculations would only make undue discrimination more transparent and more necessary.

In the proceedings leading to the NOPR, the Commission raised the pregnant question: "Should the Commission continue to use the contract path model in the future?"[20] Remarkably, this question and its logical answer in the negative disappeared from the NOPR itself, and the Commission proposals do not even speak to this fundamental problem.

Asking the Right Questions

Understanding this gulf between the Commission's goals and its proposed remedies can be approached in many ways. In the past, as described above, the emphasis has been on Order 888's "contract path" approach to transmission scheduling as being inconsistent with the laws of physics and how electricity actually flows on the nation's highly interconnected grid. While recognizing the technical validity of these comments, the Commission was not persuaded to abandon its flawed approach primarily because it could not see how to implement anything short of mandatory participation in RTOs or the

[20] Federal Energy Regulatory Commission, Notice of Inquiry on Preventing Undue Discrimination and Preference in Transmission Service, Docket No. RM05-25-000, September 16, 2005, p. 13, (emphasis in original).

even more expansive Standard Market Design. However, there is an alternative. The full RTO model would have many advantages, but to achieve its goals the Commission could consider another path that would follow from analysis of the same fundamentals.

It may be helpful first to explore what it means to provide "comparable" service, the bedrock principle of Order 888. If the essential principle is that a transmission provider must provide transmission service to third parties in a manner "comparable" to the way it provides transmission service to its own loads, it seems logical that the initial question should be:

> *"How do or should transmission providers actually provide transmission service to themselves in meeting their own load obligations?"*

Once the actual processes of providing transmission service are clearly understood, it becomes relatively straightforward to define the "comparability" rule as "provide the same service in the same way to third parties that you provide service to yourself in serving your own loads." But the Commission has not embraced this analysis, not in Order 888 and not in this NOPR. Instead, the Commission has assumed that whatever transmission providers may do in serving their own loads reasonably could be made consistent with the Commission's contract path and ATC approach in Order 888.

Another path the Commission might take would be to ask how transmission service is provided to third parties by traditional jurisdictional utilities, and compare that to how transmission service is provided to the same parties by today's RTOs -- such as PJM, ISO-New England, New York ISO, Midwest ISO, the California ISO, and even ERCOT. Such a comparison would immediately reveal that although the Commission has declared both non-RTO jurisdictional utilities and RTOs to be in compliance with

Order 888's requirements, in fact *transmission service to third parties is clearly NOT provided by non-RTO utilities in the same way that such service is provided by the RTOs*. Indeed, it will often happen that a third party transaction (such as a proposed point-to-point schedule) will be denied access (or subsequently curtailed) by a non-RTO utility simply following the rules of Order 888, while exactly the same transaction would be accommodated without curtailment and with no adverse consequences to grid security by an RTO applying its rules – also deemed to be Order 888 compliant – under exactly the same grid conditions.

How are these contradictions possible and why does the Commission allow it? More to the point, the Commission might well ask, "what is the difference between how these entities provide service to third parties, and what is wrong with Order 888 that allows such contradictory results?"

Further, the Commission might ask "where do we find continuing problems of undue discrimination in providing transmission service?" This examination would reveal that while there continue to be concerns about undue discrimination in the way non-RTO transmission service providers provide service to third parties, there is broad agreement with the general approach used by RTOs. Every one of today's RTOs provides essentially the same (i.e., non-discriminatory) service to *all* parties who seek to use the grids operated by the RTOs.[21] The point here is not to argue that all jurisdictional

[21] This is not a claim that none of the rules of the various RTOs results in some discrimination. All of the RTOs administer a broad range of rules, and from time to time, each RTO finds it necessary to revise its rules to eliminate unintended discriminatory effects. Rather the claim here is that the general approach used by RTOs in providing open access to the grid is inherently non-discriminatory, because it applies a consistent, non-discriminatory approach to *all* users, both in granting access and charging for grid usage. That is generally not true with respect to the OATTs of non-RTO transmission providers, because Order 888 does not really identify or require a non-discriminatory approach; it *sanctions* discrimination.

utilities should be under RTOs – that is beyond the scope and purpose of this NOPR. But at a minimum, the Commission should be asking, "how do RTO's actually provide transmission service in a non-discriminatory fashion? What are the essential features of the RTO tariffs that ensure non-discriminatory service? And what are non-RTO utilities doing (or not doing) that is so different that there are still concerns about undue discrimination?" The NOPR has apparently not asked or answered any of these obviously relevant questions.

The closest the NOPR comes to addressing the basic issues is found in the description of conflicting approaches for ATC calculations:

> "…there are two main approaches to calculating [Available Transfer Capability] used in the industry. The first is the contract path approach, which is more commonly used by transmission providers in the Western Electricity Coordinating Council (WECC) region.[fn] The contract path methodology derives ATC directly from predetermined [Total Transfer Capability] … values derived consistent with contract path transmission rights. The second method is the flowgate[fn] approach, which is used more widely in the Eastern Interconnection.[fn] The flowgate methodology is based on physical power flow models. The flowgate calculation first determines [Available Flowgate Capability] and then converts AFC into ATC and derives TTC for the OASIS posting. *The differences between the two approaches may not result in significantly different ATC values if consistent data inputs and industry acceptable modeling assumptions are used.*"[22]

Under what consistent data inputs and modeling assumptions would the two methodologies produce results there were both consistent with each other and consistent with actual operation of the transmission system? Essentially there would be two requirements:

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[22] OATT 2006 NOPR, pp. 79-80, emphasis added.

- The AFC methodology incorporates all the (many) contingency constraints on lines and interfaces.
- The contract path capability calculation is independent of the actual use (not just the ATC) of other contract paths.

The first requirement presents a practical difficulty, because there are too many flowgates. The second requirement is more fundamental, because it applies only to radial or controllable lines. The second requirement is inconsistent with actual operation of a transmission network system with loop flow. Hence, while the Commission's NOPR attempts to deflect the issue, by implying that the inconsistencies are minor and addressable through standardization of assumptions, the reality is quite different.

The difficulty is reflected in the continuing fact that the Commission itself has always avoided any attempt to define exactly how to obtain ATC from first principles. Order 888 asserted that the answer would appear in the companion Order 889. In the event, Order 889 did not provide the details but simply directed each utility to file an ATC methodology. In the present NOPR the Commission continues to direct others to work out the details and file a consistent and transparent approach.

There is a good reason that there is no Commission enthusiasm for taking on itself the task of making the definition transparent. It does not follow from a lack of expertise at the Commission. It is not that many definitions are possible and it is merely convenient to let the industry choose one approach The reality is that the task is much harder than drawing a reasonably round circle. The reality is that the task is more like creating a square triangle. There is a fundamental contradiction inherent in the basic concept. Only by agreeing to avert our eyes can we fail to see that there is no resolution along this path, and any reform within this framework inherently must be arbitrary.

It would be unfortunate if the Commission's efforts to eliminate undue discrimination led a reviewing court to find even the "reformed" rules to be arbitrary and capricious, but that result would seem inevitable once the inconsistent results were explained and Order 888's conceptually flawed framework were contrasted with the realities of grid operations and how transmission service is actually provided. Unless the Commission realigns its rules with grid and operational realities, and provides for truly comparable service to all parties, it risks undermining its entire legal framework for complying with the most basic responsibilities under the Federal Power Act.

Approaches to Transmission Policy through Balancing Services and Imbalance Pricing

There is virtually no disagreement between non-RTO utilities and RTOs about the real-time operational features of how transmission is and should be provided to meet the service providers' load obligations. *Non-RTO utilities and RTOs use the same basic approach*. The importance of this virtual consensus cannot be overemphasized. Notwithstanding all the debates about whether jurisdictional utilities should or should not become RTO members, should or should not open their systems to accommodate market transactions, and whether and how retail rates should reflect wholesale market prices, there is a fortunate consensus on how to operate the system in real time to meet loads in a reliable and least-cost manner. *The industry-wide consensus approach is called "security-constrained, economic dispatch."* Moreover, when fully understood, this approach provides a sound basis for defining critical rules for open transmission access in a way that eliminates a major source of undue discrimination in providing transmission service. How does this work?

How do non-RTO utilities provide transmission service to reliably serve their native loads at least cost?

Consider first any non-RTO utility that operates a portion of the interconnected grid – a "control area" -- to meet an obligation to serve its "native loads." The utility operates the system by arranging and implementing a security-constrained, economic dispatch. The system operator's dispatch (along with moment to moment "regulation" in between dispatch intervals) maintains reliability at all times by precisely balancing the system (generation injections must at all times match load withdrawals plus transmission and distribution thermal losses), maintaining flows across all lines within their security limits (sometimes called "congestion management"), and maintaining voltage levels through the proper balance between real and reactive power. In short, the system operator's dispatch reliably meets all demand and keeps the lights on, but *the dispatch also defines how transmission access is provided*.

> *Open transmission access is very much about how the dispatch is arranged and implemented.*

A dispatch is reliable in that it imposes the security requirements as operational constraints. To maintain frequency, any electricity system must maintain essentially instantaneous balance between generation and load plus thermal losses. To achieve this balance, the system operator adjusts flexible generating plants and loads. Whether this is described in terms of dispatch, net dispatch, or redispatch relative to schedules, the result is the same. Changes in load or generation, whether scheduled or not, must be balanced in real time, all the time.

Transmission limits and other constraints restrict the dispatch choices available to the system operator. There is a reliability requirement to stay within the operating limits of the grid, in order to protect against events which could cause cascading failures. These requirements for system balancing and dispatch existed before electricity restructuring, and continue in the context of wholesale electricity markets. Whether intentionally or as a byproduct, by whatever name, these actions amount to providing a security constrained dispatch.

A security-constrained economic dispatch is "economic" in the sense that system operators dispatch their available plants in economic merit order, subject to availability, start-up, ramping and other costs and operational limitations. System operators have traditionally considered cost in order to achieve an economic dispatch. This is not new. There must be some criterion to guide the choice of which generation and load should be adjusted to achieve the security constrained dispatch, and the natural choice is to seek the most economical combination within the many constraints. In a traditional system the costs might be determined by engineering estimates. In organized wholesale markets the offers of generation and bids by load would serve the same function. This criterion leads to a security-constrained economic dispatch.

The economic aspect of the dispatch is about serving consumers efficiently; it is meant to ensure that the mix of plants the utility has on line at every moment tends to be the lowest-cost mix of plants from those available that can meet the utility's service obligations and still meet all reliability requirements. But the system operators must often operate some plants "out of merit order," for a variety of reasons, particularly the

fact that transmission and other reliability constraints may limit the ability to use the lower-cost plants to serve loads and force the operators to rely on higher-cost plants.

The process of selecting "out of merit" plants to meet reliability and service obligations is sometimes called "redispatch," but the process is not a second step; redispatch is performed as an integrated part of security-constrained, economic dispatch, in each dispatch interval (typically every five minutes). Moreover, the redispatch is still the lowest cost solution, even though it relies on selecting plants out of the economic merit order that would apply if there were no constraints. In arranging redispatch, a responsible utility system operator will, as much a practicable, still select the lowest-cost mix of plants (and output from each plant) to solve the total (re)dispatch problem, whether it is alleviating transmission congestion, maintaining voltage support, or simply maintaining system balance.

For purposes of understanding how transmission access is provided, the essential point here is that utility system operators routinely use redispatch to serve native loads. That is, they consistently use security-constrained economic dispatch, including redispatching plants out of merit order, whenever transmission or other security limits prevent the use of simple merit order dispatch.

> *Providing transmission service to native loads thus means using security-constrained, economic dispatch at all times to accommodate all of the grid uses needed to serve those loads, including out-of-merit redispatch to relieve transmission congestion when needed to keep flows within transmission security limits.*

How Order 888 Limits Transmission Access

A conspicuous defect in the Commission's approach to open access is that it does not recognize that "open access" to transmission must include open access to the system operator's security-constrained, economic dispatch. This access to security-constrained economic dispatch is necessary to prevent undue discrimination in balancing services, imbalance pricing and transmission operations. Instead of acknowledging how utilities actually provide access to themselves to meet their native load obligations, Order 888 sanctions an entirely different and inherently discriminatory way to provide only limited access to third parties. And that approach is so inconsistent with grid realities – it literally defies the laws of physics -- that it often permits scheduled grid uses that would result in more flows than the grid can safely handle. Such unsafe over-scheduling in turn requires yet another system – NERC's Transmission Loading Relief (TLR) curtailment system -- to correct the threats to reliability created by the Commission's approach to scheduling grid usage. While NERC's TLR curtailment system is necessary to keep the grid from collapsing from the results of Order 888's scheduling method, the TLR method is inefficient, imprecise, uncertain, and so time-consuming that it cannot deal quickly enough with serious system contingencies and thus forces operators to be more protective (conservative) in scheduling grid usage in the first place. The entire Order 888 approach, which compels something like NERCs TLR system to ensure minimally safe operations, thus remains a highly risky and costly way to operate the nation's increasingly interconnected electrical grid.

Under Order 888, non-RTO transmission providers are allowed (assumed) to use security-constrained, economic dispatch to provide reliable balancing and least-cost

service to their own native loads. But despite the Commission's foundational principle of "comparability," Order 888 does not require that non-RTO transmission providers offer the same reliable, lowest-cost dispatch service to third parties. Instead, balancing services involve arbitrary bandwidth and penalty procedures that cannot in principle be related to incremental costs or applied without undue discrimination. And third parties must request transmission service through an approach that *assumes* that redispatch (security-constrained economic dispatch) is *not* available to the third party and does not have to be provided by the transmission provider to accommodate third parties' schedules. In responding to such third party requests, the utility must first predict how its own security-constrained, economic dispatch to serve its own loads will affect grid usage, and then ask, *"given my expected grid usage over the life of the request, what's left for third parties, assuming no further redispatch is permitted beyond that necessary to serve my own native load?"*

Answering the question "what's left?" requires the utility to make numerous assumptions *ex ante* about how it will use the grid over time, and then after accounting for that expected use, calculate[23] ATC. It is hard to imagine a defensible way for the Commission to second guess all of the underlying estimates and assumptions, even if one

[23] Even ignoring the "contract path" fictions embedded in the Order 888 approach, the term "calculation" is misleading. While "calculation" is certainly involved in arriving at an ATC number, the result is really no more than a gross estimate of what would actually be available if the assumed grid conditions and the utility's forecast of loads, plant availability and costs and resulting grid usage were exactly as predicted, and the utility's security-constrained, economic dispatch to serve it's own loads were exactly as predicted. The results are no better than the intrinsically uncertain assumptions, but this only partly explains why the Commission's focus on perfecting the ATC calculations is so misguided. The more fundamental problem is that the utility's security-constrained economic dispatch would be *different* if the third parties' proposed injections, loads and/or schedules were accommodated when arranging that dispatch.

otherwise agreed on the ATC calculation methodology.[24] If, after calculating ATC – i.e., defining how much capacity is left without further redispatch – the utility's answer is "nothing" or "not enough," then the utility transmission provider can deny or curtail the third party's requests for transmission service.

Of course, both the Commission and the states would view these same negative answers as unacceptable (and technically wrong) if the issue were about serving the utility's native loads. In the extreme, such answers could mean that some of the utility's own native loads would not be served, even though the utility had adequate supplies and it was physically possible to serve those native loads if the utility simply used standard security-constrained economic dispatch and redispatched plants to reliably serve all loads with the lowest-cost mix of plants that could meet loads and reliability constraints.

While the Commission (let alone, the states) would never permit these "no" or "not enough" answers to denigrate reliable service to the utility's native loads, Order 888's framework allows/requires that utilities routinely provide these negative answers to third parties who are, after all, serving *some one else's native loads*.[25] In other words, the Commission's approach undeniably denigrates reliable and least-cost service to some parties' native loads, in violation of Congress' intent in the Federal Power Act that native loads be protected and despite the fact that the NOPR lists "protection of native load customers" as a Commission priority.

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[24] For the moment, this discussion ignores the problematic feature of most ATC calculations, which rely on a "contract path" approach inconsistent with the laws of physics. Here the focus is solely on whether asking about ATC is conceptually even the right question.

[25] "Some one else's native loads" could mean another jurisdictional utility's load, a non-jurisdictional utility's (e.g., municipal) load, or load in the same service area served by an independent supplier in a retail choice state. Former Commission Chairman Martin Allday's famous observation that "Everybody is somebody's native load customer" still captures an important truth.

It should be apparent that the reason the Commission's approach fails to meet the requirements of open, comparable transmission service and fails to reliably serve native loads at lowest cost is that the approach asks the wrong question. Instead of asking "what's left (using ATC calculations) for third parties, assuming no further redispatch is permitted," the Commission should require all transmission providers to ask the same questions it would ask if the provider were serving its own native loads. The Commission's NOPR should therefore ask and answer the following questions:

> *How can the requested service be accommodated through security-constrained economic dispatch (redispatch)?*
>
> *What should the service provider charge for that (re)dispatch service?*

The Commission raises the question about the appropriate pricing of imbalances: and proposes a particular model drawn from the experience of its use in Bonneville Power Administration.[26] This includes the explicit notion of incremental pricing,

> "With respect to the pricing of energy and generator imbalances, the Commission believes that charges based on incremental costs or multiples of incremental costs will provide the proper incentive to keep schedules accurate without being excessive."[27]

However, the Commission does not explain how its proposed balancing model relates to the real operation of the grid or comparability across customer groups. The appeal to the notion of incremental pricing calls out for a more explicit formulation that

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[26] FERC, NOPR, pp. 171-172.

[27] OATT 2006 NOPR, p. 173.

characterizes the connection to security-constrained economic dispatch and the associated locational prices that define the marginal costs of redispatch and imbalances.

These are the relevant questions that Order 888 failed to address adequately or consistently and which the Commission has avoided asking in its "reform" NOPR. It is time for the Commission to start asking the right questions. Fortunately, the collective experience of RTOs demonstrates that the industry already knows how to answer these questions.

How do RTOs Provide Non-discriminatory Transmission Service?

If non-RTO utilities use security-constrained, economic dispatch to provide the lowest-cost, reliable service to their native loads, how do RTOs function to meet their load obligations? The simple answer is, *RTOs do essentially the same thing as non-RTO utilities do when serving their native loads, and they do it for everyone.*

> *RTOs provide security-constrained, economic dispatch to reliably serve **all** loads at lowest cost, except they do it over a larger region of the interconnected grid.*
>
> ***All** loads in the RTO footprint are treated as "native" and all are entitled to the benefits of "least-cost" balancing and congestion (re)dispatch.*
>
> *Because they don't and cannot discriminate or cross-subsidize between different owners and users, RTOs use marginal cost pricing to charge and pay for balancing and redispatch grid services.*
>
> *RTOs use the Commission's alternative ATC-TLR approach only when forced to where regional security-constrained, economic dispatch is not possible. This virtually never happens inside the RTO footprint, but it does happen at the RTO boundaries with non-RTO control areas.*[28]

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[28] RTOs may also be required to treat some parties differently for interim periods following the commencement of open access tariffs. These "grandfather" situations are typically limited in duration and

RTOs thus use the same principle of security-constrained, economic dispatch that non-RTO utilities use for their native loads to reliably serve all loads within the RTO footprint at least cost. The concepts are identical; the details differ to account for the fact that unlike most non-RTO utilities, the RTO does not itself own any of the generators used in the dispatch. This fact requires that the RTO accept price-quantity offers (or proposed schedules) from all generators wishing to participate in the dispatch, and the RTO uses those offers and schedules to arrange the lowest-as-bid cost dispatch consistent with the system's security constraints. Balancing for the entire system is thus done at the lowest as-bid cost, and the RTO's balancing service is available to all users; congestion management (redispatch) is similarly done at the lowest as-bid cost, given the security constraints, and is available to all users. All loads/consumers relying on the dispatch are thus assured that the RTO will reliably serve them, balance the system, maintain voltage, and manage all congestion and other transmission constraints at the lowest as-bid cost possible, given the generators' schedules offers (and eligible demand bids) available to the RTO's independent system operator.

In principle, this is no different from how a non-RTO utility system operator would (or should) function. However, the fact that the RTO is an Independent System Operator (ISO), and not a generation owner, necessarily leads to some important distinctions. First, each generator's costs used to arrange a least-cost economic dispatch must be submitted through explicit offers; in the non-RTO utility system, the same

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also allow the affected parties to receive service under the RTO's non-discriminatory, open access tariff provisions earlier, if they choose.

information is needed to arrange the dispatch, but it would presumably be known internally by the utility's dispatchers as a result of common utility ownership. More importantly, however, any generation owner may participate in the RTO dispatch, which the RTO arranges without regard to who owns any given plant. Only the plants' respective offers (costs) and operating characteristics that might affect its ability to be dispatched are relevant to the RTO.

As a result, the RTO does not discriminate between generators in arranging its dispatch or in paying/charging generators for the energy they provide (or purchase) from the dispatch. While grid conditions such as congestion or the need for voltage support at particular locations may require that generators with certain characteristics or at certain locations be dispatched in lieu of other generators, these RTO choices are based on sound engineering and dispatch practices linked to reliability requirements and costs, and not on who owns the plants. This is how RTOs ensure non-discrimination and least cost consistent with ensuring reliability.

Treatment of Merchant Plants and Intermittent Resources by RTOs

The Commission's concern that "merchant" generators and intermittent generators might be subjected to discrimination does not apply to RTOs, because each ISO's dispatch is open to all generators on non-discriminatory terms. Any generator may offer its power to the RTO/ISO's security-constrained, economic dispatch. Every generator has an opportunity to be selected for this dispatch, and the ISO's selection will be based solely on the generator's offer prices and operating characteristics; ownership, whether by a utility or a merchant, is irrelevant.

Every generation technology has an opportunity to be selected. Intermittent plants, which by nature may not be able to predict their output or respond to five-minute dispatch signals may "self-schedule," but these generators need not submit fixed schedules; they generate when they can. They are then compensated for their actual injections in each dispatch interval, whatever they may be, based on the marginal cost at that time and location of the injections. The RTO applies the same compensation principle to every other type of plant injecting energy in the dispatch.

Treatment of Merchant and Intermittent Plants by Non-RTOs

In contrast, it is conceivable that a non-RTO utility dispatch functioning under Order 888 could discriminate against plants owned by another utility or merchant owner who offered its power to the utility dispatch. In the worst case, the dispatcher could simply refuse to accept power from these merchant plants, or it might accept it only under terms and conditions different from those it uses to accept power from the utility's own comparably equipped and situated plants. This would not only be discriminatory, it would very likely raise the utility's costs of serving its own loads, because potentially lower cost suppliers were being excluded from the dispatch, while higher-cost units owned by the utility were included. For example, older utility plants often have higher heat rates that result in higher costs per megawatt-hour, while newer merchant plants typically have lower heat rates and thus lower operating costs (and likely lower emissions as well). All other factors being equal, the lower-cost units should be selected for dispatch before the higher-cost units, and if they are not, there is reason to suspect discriminatory treatment. In the open dispatch processes of RTOs, such discrimination does not occur.

Even if the non-RTO dispatchers granted access to merchant plants, discrimination can still occur under Order 888 if the utility uses anything other than marginal cost pricing to charge or pay for energy imbalances attributed to the non-utility generators. Order 888's reliance on error bands and formula "penalties" is inconsistent with marginal cost pricing. It fails to reflect how imbalances are actually handled – by changing injections of the marginal plants on the dispatch – and thus fails to reflect the fact that the costs of such changes are, by definition, "marginal costs."

Dispatch marginal costs may differ in each dispatch interval and at each location, depending on grid conditions and the costs and characteristics of plants available to the dispatch during that dispatch interval. Because Order 888's approach to handling and pricing imbalances reflects neither system dispatch conditions nor the marginal costs of adjusting the dispatch for imbalances and for congestion redispatch, the current approach is inherently arbitrary. Moreover, the predefined penalties tend to be inconsistent with the dispatch; generators subject to Order 888 in non-RTO utility systems thus fail to receive incentives that consistently encourage compliance with dispatch instructions.

In contrast, RTOs apply consistent marginal cost pricing to pay and charge for imbalances and congestion redispatch at each location, thus reflecting actual grid conditions and variations in marginal costs at different times and locations. The pricing scheme is inherently non-discriminatory. And because the RTO's marginal cost prices are derived directly from the actual security-constrained dispatch and the generator offers, the prices support reliability; that is, the prices paid or charged to generators for imbalances or deviations from schedules are consistent with the incentives the generators need at each time and each location to encourage the generators to comply with the

system operator's dispatch instructions. When generators follow dispatch instructions, the lights stay on.

Marginal cost pricing of the dispatch is both logical and consistent with the way a non-RTO utility actually operates its system when meeting its own loads. When an incremental MW of load appears on its system, the next increment of supply will be dispatched from the next most costly resources that can supply that next MW while satisfying grid constraints. The cost of serving that incremental load is thus the marginal cost of the unit(s) used to meet it. That is the same marginal cost pricing principle RTOs use. Similarly, if a third party schedule is 1 MW short, and causes a 1 MW imbalance, the utility dispatchers will cover that imbalance by changing the dispatch of the marginal unit(s); hence, the cost of meeting that imbalance is the marginal cost, not the average cost of the utility's dispatch or some pre-determined penalty. Using the average cost or a formula penalty would either subsidize the third party or force that party to subsidize the utility. Neither result is consistent with open access or efficient, competitive outcomes.

There is no dispute that there must be security constrained (re)dispatch to address transmission constraints and imbalances. The only question is whether or not FERC should require economic redispatch or rather should support uneconomic redispatch. Given a security-constrained economic dispatch, there is only one known pricing method that is consistent with actual operation of the grid and can be consistently applied to all transmission users. This pricing uses the marginal opportunity cost of redispatch at each location. This is distinct from the average cost of redispatch and various load-ratio cost allocation approaches. Experience with economic balancing and consistent pricing exhibits the benefits of a virtuous circle. A well-designed balancing function creates

incentives to reinforce reliability and further simplifies other remaining problems associated with open access and support of competitive markets.

Efficient real-time operations conform to security-constrained economic dispatch, and the prices or opportunity costs at the margin equal the much discussed locational marginal prices. Any other outcome will create problematic incentives requiring intrusive mandates and rules to maintain reliability and achieve efficiency. Familiar objections to this approach do not withstand scrutiny.

One objection is that economic balancing with consistent and transparent pricing would be so good that it would reverse the direction of undue discrimination. The argument appears to be that transmission customers would cherry pick across network service, point-to-point service, firm and non-firm, to avoid paying for other costs not included in locational balancing costs (grid costs, regulation, operating reserves, reactive support, system operations, and so on). This implicates the cost allocation rules, and inconsistencies in regulatory design for alternative services. A solution would focus on the cost allocation rules, or on a more consistent definition of network access service.

Another objection is that imbalance penalties relative to hour-ahead schedules are needed to promote good scheduling practice and protect reliability. The assertion is repeated often without explanation. If consistent pricing that reflects marginal opportunity cost at a location is not applied, then penalties may be needed. But with consistent locational pricing, arbitrary and substantial penalties that conflict with efficient incentives may interfere with reliability.

A related concern is that efficient balancing and pricing require an organized day-ahead market to support unit commitment. However, unit commitment issues are

amenable to other narrower reliability solutions. And with the Order 888 emphasis on flexibility to change schedules 20 minutes before the hour, without penalty, balancing penalties that deviate from incremental costs provide little or no incentive for long-lead time commitments.

The transmission provider must operate a balancing system that becomes security constrained (re)dispatch. With economic (re)dispatch, the only pricing system consistent with open access and non-discrimination is the use of locational marginal opportunity costs. However, the history of the debate before the Commission might raise a political concern that this path to preventing undue discrimination and preference in transmission service by providing access to the dispatch would exhume the corpse of a policy now dead and fully buried. Is the combination of economic balancing and consistent pricing a stealth version of "Standard Market Design?"

The answer is simple: No. The proposal developed by FERC for Standard Market Design covered much more ground. It is true that economic balancing and consistent pricing would be consistent with the Standard Market Design, but only because it is consistent with actual use of the transmission system. Economic balancing and consistent pricing would be consistent with Order 2000 or any other successful system of open access and non-discrimination. Any system without economic balancing and efficient pricing would create perverse incentives that either undermine operations or undermine investment. Inexorably, the perverse incentives will create the need and pressure for regulators, including FERC, to take on more and more obligations to mandate and control electricity investments. This would protect undue discrimination

and preference in transmission services and undermine support of open access and competitive markets.

What Would Workable Open Access ReformsIinclude?

A viable path to Order 888 reform is to start from the premise that open access to the dispatch (and redispatch) and marginal cost pricing for imbalances and redispatch to accommodate transmission are keys to getting open, non-discriminatory access to transmission. That foundation will allow the Commission to analyze the problems with the current Order 888 and fashion genuine reforms consistent with actually grid operations and the foundation principle of comparability.

> *The dispatch is the essential transmission service. Providing open access to this dispatch is a path to achieving open, non-discriminatory access to transmission.*

A third party cannot effectively access the grid without accessing and closely interacting with the system operator's dispatch. If a third party wishes to make simple "spot" (aka economy energy) sales to or purchases from the utility, it must have access to the utility's dispatch. If it arranges a specific megawatt injection (eg, 100 MW for the hour), but its injections do not match its schedule (eg, only 95 MW), it must have access to the dispatch to cover its imbalances (5 MW). If it seeks to meet its contract loads or otherwise schedules a point-to-point transaction, it must have access to the dispatch not only to cover any imbalances but also to acquire redispatch service to allow its schedule to proceed without curtailment while the system operators redispatch to handle transmission congestion.

The dispatch provides the balancing service that all grid users require. It provides the means for spot sales and purchases. And it provides the redispatch (congestion management) service to accommodate schedules (in lieu of TLR curtailments) when the grid is congested. Without access to the dispatch, open transmission access is not possible. This leads to an important principle that should be reflected in any OATT reforms adopted by the Commission:

To achieve the same non-discriminatory, least-cost result that RTOs automatically provide through their open, bid-based security-constrained economic dispatch, the Commission should require non-RTO utilities to make their dispatch (and redispatch) open to all according to the requirements of security-constrained economic dispatch.

Open transmission access requires open access to the dispatch. To avoid discrimination and cross-subsidies between grid users, charges and payments for these dispatch services should be based on the marginal costs of the dispatch service.

A History of Flawed Analyses

The pattern of Order 888 analyses by the Commission makes transparent the crying need for a well-defined framework that provides a principled basis for designing policy and the details of open access to prevent undue discrimination and preference in transmission services. The basic framework of real time operations using security-constrained economic dispatch meets that need. Absent a commitment to the implications of this coherent framework, the Commission would necessarily embrace arbitrary rules that could not meet its objectives or mandate.

The problems associated with the Commission's analysis of undue discrimination are evident throughout the NOPR. Of particular concern is the NOPR's summary of the history of the Commission's attempts since Order 888 to remedy undue discrimination and promote competitive markets.[29] Nowhere in this entire discussion does the NOPR discuss the essential dispatch service or explain that access to a security-constrained, economic (re)dispatch, and pricing that (re)dispatch at marginal cost, are the foundation for providing open, non-discriminatory access to transmission. Instead, this discussion shows how the Commission has continuously misdefined the nature of transmission service beginning in Order 888, and continuing through Order 2000, its later ill-fated attempts to standardize market design, and this NOPR.

We first see this flawed definition in the NOPR's discussion of early efforts to require jurisdictional utilities to provide "wheeling" of third party transactions over utility-owned transmission lines.[30] "Wheeling," of course, was promoted by Congress under the PURPA, the Public Utilities Regulatory Policy Act (1978). Unfortunately, the term "wheeling" fostered the flawed notion that transmission service could be understood as a transportation concept, just like trucking products down some chosen highway. This transportation image was wrong from the beginning, because it appeared to support the notion that transmission service was a matter of allowing a third party to "wheel" electricity along a selected highway – that is, along a "contract path." In reality, however, electricity obeys the laws of physics and flows along all possible paths, from source (point of injection) to sink (point of withdrawal), with flows allocated among the

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[29] NOPR pages 8 through 32.

[30] NOPR at 8.

possible paths in inverse relationship to the degree of resistance of each path. The Commission acknowledged this in response to comments, but the "contract" path imagery persisted and became the foundation of Order 888's flawed scheduling system. That system requires NERC's TLR system to correct the unsafe over-scheduling that would otherwise collapse the grid.

The NOPR's history expands these false concepts at pages 9-10, where it discusses the history of the Commission's efforts to prevent affiliate abuse in the context of open access and promoting competition. In those efforts, the Commission sought to deal with "market-based rates," but it never made the connection between "market-based rates" and the marginal costs associated with the security-constrained, economic dispatch. In RTO markets, the marginal costs of this dispatch produce "market-based" spot *prices*, but this critical connection is never mentioned in the NOPR. Indeed, the terms "dispatch," "redispatch" and "marginal cost" never appear in the NOPR's history.

This confusion continues in the NOPR's discussion of the Commission's Order 888 efforts to require "functional unbundling," under which "the transmission element of a wholesale sale is separated or unbundled from the generation element of that sale," and under which utilities were required to "separately state their rates for wholesale generation, transmission and ancillary services."[31] But providing transmission service is about providing access to the dispatch, and when there is congestion, access to redispatch. As all of the Commission-approved RTO tariffs explain, the marginal cost of congestion redispatch is a function of the difference in marginal costs of providing

[31] NOPR at 12, and fn 16.

energy at each location. In other words, every RTO's tariff is founded on the principle that the wholesale price of a key transmission service (e.g., redispatch) is directly related to the wholesale price of energy. *The marginal costs of energy and transmission are inseparably linked*. Yet despite the fact that the Commission has, since 1996, approved RTO tariffs that are founded on this now widely accepted link, the NOPR discusses the concept of "unbundling" solely in terms of artificially separating the rates for energy from the rates for transmission. Nowhere does the NOPR explain that in true open access regimes, this separation applies *only* in the context of having a separate transmission rate for recovery of the grid's sunk or fixed costs, whereas in real time, the opportunity costs of providing transmission service are defined by the locational difference in energy prices associated with the security-constrained dispatch. Every RTO in the United States[32] provides transmission service under that principle, but one would not know that from reading the NOPR.

Having misidentified the essential nature of transmission service as "wheeling" or "contract path" scheduling, and failing to identify open transmission access with access to the system operator's dispatch, the NOPR then describes how the Commission imposed a "reciprocity" requirement on non-jurisdictional entities.[33] This requirement essentially required non-jurisdictional utilities to use the same misguided notions of Order 888 in granting access to their own systems as Order 888 required jurisdictional utilities to impose when granting access to their systems to non-jurisdictional utilities. What the NOPR does not say, but which is now apparent, is that the "reciprocity"

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[32] The same principle has been approved for implementation by the California and ERCOT ISOs.

[33] NOPR at 12.

requirement in effect forced both jurisdictional and non-jurisdictional utilities to use the same flawed concepts, so that the discrimination inherent in Order 888's contract path-ATC-TLR framework became codified and uniform throughout non-RTO regions of the country. The Commission had now taken two steps backwards.

According to the NOPR, Order 889 then codified ATC as "an easy-to-understand indicator of service availability."[34] This is an astonishing misconception. In fact, ATC is an illusory indicator of the grid's capacity even in the context of an approach that denies third parties the most essential transmission services of balancing and redispatch in the face of congestion. In Order 889, the Commission convinced itself that if the utility's own merchant generation business had to rely on the same ATC calculation as third parties, then the utility would have an incentive to calculate ATC in a disinterested and accurate manner – that is, "as accurately and uniformly as possible."[35]

Of course, the NOPR's admission that ATC continues to be calculated in different and inconsistent ways suggests that its hopes in Order 889 were not realized. But the reason for this disappointment has less to do with how ATC is calculated and far more to do with whether the question the calculation is trying to answer -- "how much capacity is left if we assume no further redispatch for third parties" -- is even the right question. Yet nowhere in the NOPR's discussion of this history is this more relevant question even considered.

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[34] NOPR at 14, and fn 12.

[35] NOPR at 15.

Indeed, in describing Order 2000, the Commission's response to what it was learning from the successful operation of Eastern ISOs, the NOPR never uses the words "dispatch" or "redispatch." Instead, it talks about "internalizing parallel flow, managing congestion efficiently and operating markets for energy, capacity and ancillary services" without ever explaining how all of these things are done through an ISO's regional security-constrained economic dispatch.[36]

Equally puzzling, after noting the formation of several RTOs, the NOPR observes [at 16-17] that the RTOs have since taken over the responsibility for calculating ATC, as though that task is the essence of providing transmission service. There is no mention of the fact that "internalizing parallel flows, managing congestion efficiently and operating energy . . . markets" is done through the RTO's bid-based, security-constrained, economic dispatch, or that the dispatch/redispatch, which are essential services for ensuring access to the grid, are consistently priced at marginal costs. Nor does the NOPR acknowledge that the reason this service when performed by RTOs meets the requirements for non-discrimination is because the RTOs offer these same dispatch services to *all* grid users and apply the same marginal cost pricing principles to charge/pay *all* parties who use those services. How can the same Commission that has approved the same approaches over and over again for every RTO in the country not acknowledge these critical principles of open access in the document expressly focused on the nature of transmission service and how it should be provided without discrimination?

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[36] NOPR at 16.

Surprisingly, the NOPR's discussion of history asserts that "even in RTO markets, there are instances when comparable transmission service is not provided, particularly in the area of transmission planning."[37] The Commission knows full well that all of the RTOs are doing far more regional planning than ever occurred in the absence of RTOs. But more to the point, this offhand NOPR criticism implies that the key indicator of whether a transmission provider discriminates against third parties is not whether it opens or closes its dispatch to third parties, but rather how RTOs, which are independent entities that do not own or profit from transmission, conduct regional planning for future transmission upgrades.

The NOPR's history notes that "EPAct 2005 also authorized the Commission to require unregulated transmission utilities (expect for certain small entities) to provide access to their transmission facilities on a comparable basis."[38] To meet this comparability requirement, the Commission will first need to revise its description of how transmission service is actually provided by RTOs and by non-RTO utilities when serving their own loads.

The NOPR also seems concerned that transmission providers may have "unnecessarily broad discretion" that allows undue discrimination.[39] On its face, this general concern is valid. But the NOPR apparently does not understand that the flawed conceptual framework of Order 888 provides the legal cover for exactly the kind of

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37 NOPR at 17.

38 NOPR at 18.

39 NOPR at 22.

"unnecessarily broad discretion" that enables discrimination. The "broad discretion" non-RTO utilities have is in whether to allow third parties access to their dispatch. Under Order 888, a non-RTO utility is free to decide whether or not to purchase from third parties, and thus whether or not to allow third parties access to the spot market that arises naturally from an open dispatch (as happens in RTO systems.) In RTOs every party has this opportunity; in non-RTO systems, the utility has complete discretion to say "yes" or "no." Discretion doesn't get any "broader" than that. Similarly, if congestion is possible, the non-RTO utility is also free to decide whether or not to allow access under the same redispatch process the utility uses to serve its own loads when the grid is congested.

Under Order 888, the decision to deny or grant the essence of transmission service is thus entirely within the utility's discretion. If the utility decides "okay," we never hear about it. But if it decides "no," no one can complain because Order 888 allows the non-RTO utility to impose the restrictive ATC-TLR approach on the third party, under which service can be denied if there is "not enough" ATC, or curtailed under TLR if congestion arises later.

Thus, while the Commission is concerned about the discretion utilities might exercise in performing calculations within the ATC-TLR framework, that focus is straining at a gnat and ignoring the camel. The camel is the initial choice the utility has whether to throw the third party into the Order 888 contract path-ATC-TLR framework in the first place. The Commission's narrow focus on ATC's ambiguities allows it to

conclude that "perhaps the most obvious deficiency in this regard is ATC calculation,"[40] while the NOPR ignores the far more important and total discretion Order 888 permits about whether third parties get access to the essential dispatch services.

The NOPR furthers the confusion in discussing the effects of congestion:

> [T]he ability and incentive to discriminate increases as the transmission system becomes more congested. Vertically integrated utilities do not have an incentive to expand the grid to accommodate new entry or to facilitate the dispatch of more efficient competitors.[41]

The Commission does not explain why these statements make sense. The first assertion is incorrect and misses the point. While increasing use of the grid leads to greater congestion, congestion by itself need not lead to discrimination *if the transmission provider (the dispatcher) offers redispatch service to all.* As long as the system operators can offer (re)dispatch service to all, congestion is not itself a barrier to access. The problem is that Order 888 allows a non-RTO utility to deny grid access by refusing of offer redispatch service when the grid might be congested. In other words, the problem is in Order 888, not with congestion *per se*. In RTOs, increased congestion does not lead to discrimination; it merely means an increased need for redispatch to remove the congestion, and this in turn may increase the marginal costs of providing redispatch. The marginal costs apply to all grid users, so discrimination does not occur.

Moreover, when any party offers schedules whose flows move opposite the congestion, the resulting flows actually decrease congestion. Under every RTO's

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[40] NOPR at 23.

[41] NOPR at 28.

marginal cost pricing rules, any party that schedules such "counterflows" is compensated for this effect, because it lowers the marginal costs of redispatch. In other words, not only does the RTO's redispatch service expand the grid's ability to accommodate schedules (compared to Order 888's ATC-TLR framework), but the RTO's marginal cost pricing system encourages and rewards third parties that reduce/relieve congestion, allowing even more schedules to flow at lower costs. Given these major benefits of the RTOs' approaches, it is worrisome that the NOPR, while expressing concern about "increasing congestion," does not acknowledge or appear to understand how RTOs, who now operate half the nation's grids, effectively and efficiently manage congestion.

With respect to whether a utility might have no incentive to "dispatch . . . more efficient competitors," the NOPR has stumbled onto something without explaining how the disincentive might occur. The problem lies at least in part in the fact that Order 888 does not provide for marginal cost pricing of the dispatch or congestion redispatch. This means that if a non-RTO utility allows third parties to use the utility's dispatch (as RTOs do routinely), the rates the utility charges under Order 888 may or may not fully compensate the utility for the marginal cost of the dispatch (for balancing) or redispatch (for congestion management). With no assurance of adequate compensation for these services under Order 888, the utility has no incentives to offer the services, even if it has no other motives for denying service. Again, the problem is in Order 888's departure from marginal cost pricing and the perverse incentives this creates to undermine open access.

The NOPR further mentions RTOs, but its main complaint here is that transmission investment in RTO regions, like the rest of the US, is lagging behind load

growth.[42] The NOPR provides no evidence or analyses that might suggest that this lack of investment is exclusive to or inherent in the way RTOs function. Moreover, it does not appear to acknowledge the billions of dollars of transmission upgrade investments that have been encouraged and approved as a result of RTO regional planning processes.

More important, the grid's current capacity is what it is, and that capacity can either be fully and efficiently utilized, up to the limits of safe and reliable operations through security-constrained, economic dispatch, or the grid can be inefficiently and deliberately under-utilized, as required by Order 888. Here again, the problem is that Order 888 does not encourage or require non-RTO utilities to offer economic redispatch, which allows the maximum and most efficient use of the grid when it is congested. Instead, it imposes the flawed contract path-ATC-TLR approach, which ignores economics and leaves the grid inefficiently and consistently underused. The NOPR never discusses the fact that RTOs routinely provide redispatch to accommodate schedules in the face of congestion, and never explains that RTOs use a marginal cost pricing method to charge for that service, whereas non-RTO's routinely use Order 888's ATC-TLR framework and imbalance penalties as a legal cover to deny redispatch or discourage service to third parties under exactly comparable conditions.

The NOPR's failure to recognize how redispatch expands the use of the grid by accommodating schedules that would otherwise be curtailed under Order 888's ATC-TLR framework then allows the NOPR to cite assertions about how inadequate the nation's current grid system is. For example, the NOPR cites Eric Hirst for the

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[42] NOPR at 28.

proposition that existing systems support "only limited amounts of inter-regional power flaws and transactions. The existing system cannot fully support all of society's goals for a modern electric power system."[43] However, the authors have no doubt that Dr. Hirst understands that availability of an open redispatch service by RTOs *expands* the existing grid's capability to accommodate more transactions; it is the Commission Order 888 framework that has artificially constricted the grid's capacity available to third parties. The NOPR does not seem to understand that security-constrained economic dispatch maximizes the ability to use the grid to its full capacity; the denial of such dispatch to third-party transactions limits that ability.

In sum, it is a fundamental misconception to conclude, as the NOPR does that the occurrence of congestion on the nation's interconnections results in "an increase in the frequency of denials of requests for transmissions service, and an increase in the frequency of transmission service interruptions and/or curtailments of transmission service."[44] This statement about the increases in denials and curtailments is literally true *only* in non-RTO regions and *only* because Order 888 requires non-RTO utilities to ask the wrong question – "what ATC is left if we assume no further redispatch for third parties?"

The increase in service denials and curtails is caused by Order 888's ATC-TLR framework. That flawed framework allows/requires non-RTO utilities to deny and curtail

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[43] NOPR at 29, citing the Eric Hirst report, *Present Status and Future Prospects*.

[44] NOPR at 30.

service requests whenever there is little or no ATC left and redispatch is not offered to the third party.

In contrast, in RTOs these same requests would all be accommodated through redispatch as long as the RTO had sufficient offers from generators to arrange a security-constrained, economic dispatch. Given this history and the repeated experience, the evidence is overwhelming. The time is long overdue for the Commission to acknowledge this fact and to reform Order 888 to require all transmission providers to offer open, non-discriminatory access to the provider's security-constrained, economic dispatch, with prices for dispatch and redispatch defined by marginal costs.

Endnotes

[i] John Chandley is a Principal at LECG who has worked on Open Access and RTO issues with the market design group. William W. Hogan is the Raymond Plank Professor of Global Energy Policy, John F. Kennedy School of Government, Harvard University and a Director of LECG, LLC. PJM Office of Interconnection provided support for preparation of this paper. This paper draws on work for the Harvard Electricity Policy Group and the Harvard-Japan Project on Energy and the Environment. The authors are or have been consultants on electric market reform and transmission issues for Allegheny Electric Global Market, American Electric Power, American National Power, Australian Gas Light Company, Avista Energy, Barclays, Brazil Power Exchange Administrator (ASMAE), British National Grid Company, California Independent Energy Producers Association, California Independent System Operator, Calpine Corporation, Canadian Imperial Bank of Commerce, Centerpoint Energy, Central Maine Power Company, Chubu Electric Power Company, Citigroup, Comision Reguladora De Energia (CRE, Mexico), Commonwealth Edison Company, Conectiv, Constellation Power Source, Coral Power, Credit First Suisse Boston, Detroit Edison Company, Deutsche Bank, Duquesne Light Company, Dynegy, Edison Electric Institute, Edison Mission Energy, Electricity Corporation of New Zealand, Electric Power Supply Association, El Paso Electric, GPU Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd., GWF Energy, Independent Energy Producers Assn, ISO New England, Luz del Sur, Maine Public Advocate, Maine Public Utilities Commission, Merrill Lynch, Midwest ISO, Mirant Corporation, JP Morgan, Morgan Stanley Capital Group, National Independent Energy Producers, New England Power Company, New York Independent System Operator, New York Power Pool, New York Utilities Collaborative, Niagara Mohawk Corporation, NRG Energy, Inc., Ontario IMO, Pepco, Pinpoint Power, PJM Office of Interconnection, PPL Corporation, Public Service Electric & Gas Company, Reliant Energy, Rhode Island Public Utilities Commission, San Diego Gas & Electric Corporation, Sempra Energy, SPP, Texas Genco, Texas Utilities Co, Tokyo Electric Power Company, Toronto Dominion Bank, TransÉnergie, Transpower of New Zealand, Westbrook Power, Western Power Trading Forum, Williams Energy Group, and Wisconsin Electric Power Company. The views presented here are not necessarily attributable to any of those mentioned, and any remaining errors are solely the responsibility of the authors. (Related papers can be found on the web at www.whogan.com).