## PROJECT NO. 42647

ERCOT PLANNING AND SYSTEM COSTS	§	BEFORE THE
ASSOCIATED WITH RENEWABLE RESOURCES	§	PUBLIC UTILITY COMMISSION
AND NEW LARGE DC TIES	§	OF TEXAS

Remarks of Dr. Michael Giberson on ERCOT Planning and System Costs Associated with Renewable Resources and New Large DC Ties<sup>1</sup>

Good afternoon. My name is Michael Giberson, I am an Associate Professor of Practice in the Area of Energy, Economics, and Law in the Rawls College of Business, Texas Tech University. I would like to thank the Chairman and members of the Commission for the opportunity to contribute to this panel today.

Many of the participants in today's workshop have deep experience with and understanding of the ERCOT grid, and a good handle on how the issues raised in this proceeding will affect their corner of the system and plans for the future. My contribution is somewhat more abstract, perhaps not surprising given my university position. But prior to joining the Energy Commerce program at Texas Tech in 2008 I had fifteen years of experience in energy regulation including several years following wholesale market and transmission policy at the Federal Energy Regulatory Commission and two years focused on market monitoring.

In these remarks I draw on insights from two areas of economics, one old and well-established and one new and more speculative. I will summarize these insights and then comment on the specific questions on today's agenda.

## Linking power systems

The well-established area of economics is that describing comparative advantage, gains from trade, and the value of connecting separate trading regions. Utilities and regulators have long understood the value of connecting separate power systems – reserve sharing and economy interchange, for example – indeed this understanding was among the motivations for forming ERCOT. Connection came with both

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costs and benefits, but the net benefits were such that now every electric utility from California to Maine, from Florida to Washington, has linked into one of three large interconnections and many are more tightly linked in ISOs.

The costs and benefits of linking power systems are so well understood that I need not say more about them, but I would observe that the benefits are not symmetrical across users of the grid: as the grid expands, consumers tend to benefit more than generators do. As the grid expands, for example, locally tight supply-and-demand conditions can be met with imports from outside systems. As a result, local peakers run less frequently, outside baseload and mid-range generators run more frequently, and price spikes are reduced in frequency and magnitude.

Local baseload and mid-range generators may run a bit more frequently too, supplying exports during tight supply-and-demand conditions in neighboring areas, but the trade-off for generators is loss of high rents obtained during price spikes in exchange for additional hours running at prices modestly above marginal cost.

While the benefits and costs of linking systems have been long known, those relative benefits and costs are not unchanging. Generally speaking, increased inter-system communication and system awareness, along with increased computational power and sophistication, tend to shift the balance even more firmly in the direction of benefits.

Recent developments, such as the California ISO's expansion of balancing service to include utilities in several other Western states, are suggestive of the growing overall benefits from coordination across systems.<sup>2</sup> Growing integration of national and regional power systems in Europe provide similarly suggestive evidence of the gains possible.<sup>3</sup>

Of course linking the ERCOT system with neighboring power systems raises legal and regulatory concerns. All of my comments assume the ERCOT system continues within its existing legal and jurisdictional framework. Conditional on maintaining the existing legal framework, an expanded ability to trade power across DC ties will offer some benefits to generators and greater benefits to consumers.

<sup>&</sup>lt;sup>2</sup> California Independent System Operator, "ISO Ushers in Energy Imbalance Market, New Era of Managing the Electric Grid," *Energy Matters* (California ISO), Vol. 2, September 2014.

<sup>&</sup>lt;sup>3</sup> Newbery, D., Strbac, G., Pudjianto, D. and Noel, P. "Benefits of an integrated European energy market," *Directorate-General Energy European Commission*, 2013.

## Electric grids and platform markets

The second area of economics I will draw upon is that of platform markets. This field of economics is newer, less developed in general and not yet carefully applied to restructured electric power markets or transmission pricing issues. For example, in 2005 a careful survey of then current issues in electricity transmission did not mention of two-sided markets or platform market concerns. The issues were not yet discussed in those terms.<sup>4</sup> Even now, when questions are being raised about transmission pricing as in this project, and in other forums, the platform market framing is not invoked.

#### Perhaps it should be.

We should move cautiously -- not even specialists in these kinds of markets are confident we understand how they work under different circumstances or how to regulate them usefully, and the existing system seems to have served ERCOT and the state of Texas well.

But this is an appropriate forum for exploring these ideas and a good time to be addressing these questions. This is an appropriate forum because the Texas model in electric restructuring has moved furthest from the old dominant form of vertical integration and furthest toward a grid and a market with platform structure. This is a good time because the Commission, ERCOT, and its stakeholders are faced with challenges for which the platform market framework may provide insight.

Among these challenges is the emergence of generators with consumer-relevant distinctive characteristics. Another challenge arises from distributed energy resources, energy storage, and the potential for microgrids. The old one-way flow of value is fading and a more complex power ecosystem is growing. The platform market framework may help us better understand the emerging environment.

## Platform markets described

A "platform market" is a service connecting two or more user groups in cases in which (1) the connecting infrastructure adds value to the exchanges between members of the user groups, and (2) with network externalities within or among the user groups. Credit card services and video game

<sup>&</sup>lt;sup>4</sup> Brunekreeft, G., Neuhoff, K., & Newbery, D. (2005). Electricity transmission: An overview of the current debate. *Utilities Policy*, 13(2), 73-93.

consoles are common examples of platform markets. Many other examples – shopping malls, online auction sites like eBay, computer operating systems – are debated.<sup>5</sup>

We need not concern ourselves with the debates to conclude that the ERCOT power grid and wholesale market provides a platform market for power generators and consumers.<sup>6</sup> The ERCOT grid offers essential infrastructure for connecting generators and consumers and the infrastructure – both the physical system and the associated rules – that adds to the value created by exchanges between generators and consumers.

Network externalities are present: the value of the system to consumers grows with the increasing number of generators because added generators contribute to reliability, system flexibility, and reduce price volatility. Greater diversity among consumers tends to improve the profitability of generators.

So the platform market framework applies. What good is it in this proceeding?

#### Pricing access to the grid

One of the areas for which study of platform markets provides insights comes in the area of pricing use of the platform technology. When power flows in just one direction, from producer to consumer, and producers offered a mostly standardize product using similar technologies, the pricing issue was relatively simple. Economically, a flat per kWh charge for use of the platform could have been imposed on either producer or consumer and the market would have worked the same.

In platform markets, marginal cost pricing on end users may no longer be the efficiency norm. While the idea of marginal cost remains coherent, marginal cost becomes contingent. If one kWh is not the same as another kWh – because of the source of the supplier, the dispatchability of the supplier, the time or day or location of the consumer, perhaps because of the dispatchability of the consumer – then we don't have a meaningful single concept of marginal cost to use as a marker of an efficient price.

<sup>&</sup>lt;sup>5</sup> Discussion is based upon Claire Weiller and Michael Pollitt, "Platform markets and energy services," Working Paper No. 1361, Faculty of Economics, University of Cambridge, 2013; J. C. Rochet and J. Tirole, "Two-sided markets: A progress report," *RAND Journal of Economics*, 37(3), 2006: 645-667; and Eisenmann, Thomas, Geoffrey Parker, and Marshall W. Van Alstyne. "Strategies for two-sided markets." *Harvard Business Review* 84.10 (2006): 92.

<sup>&</sup>lt;sup>6</sup> In this discussion, by "consumers" I generally mean the retail electric providers who directly interact with the ERCOT grid and who are therefore the "customers" of the ERCOT platform. Weiller and Pollitt frame their discussion somewhat differently to reflect conditions more typical of the England and Wales power grid.

In the emerging "complex ecosystem" of platform users – intermittent generators, distributed resources, microgrids, price-responsive loads – the pricing issue takes on more significance. It may matter whether we impose platform charges on suppliers or consumers and especially how we charge users who are sometimes suppliers and other times consumers. The challenge is seen in some areas in the disputes over net metering and charges for standby service. Getting the policy wrong may block useful innovation.

#### **ERCOT Planning and System Costs**

How do these ideas apply to the issues before this panel?

The economic literature suggests that more flexible users should be favored in pricing the platform market. For example, an energy storage project might be seen as extremely flexible consumer, and so favored. But notice also that a DC tie, if power flows are dynamic and responsive to relative prices, can also be seen as quite price-responsive load. When the power price gets high, the "load" on the DC Tie drops from high to low to zero, and then to "negative load", i.e. it becomes a supplier.

DC ties, as a category of platform market user, provide just the kind of positive cross-side externalities that other types of users would like to attract to the market. So long as the DC tie supports price sensitive flows, then system emergencies and price spikes should be reduced, prices become less volatile and more predictable, overall system production costs should be reduced – benefits are spun off all around, except perhaps for peak generators.

Generally speaking, many of the questions appear to raise concerns about added potential costs and wondering whether the rules should be changed to place those costs more squarely on the DC ties. In my view this perspective neglects that spillover benefits that DC ties can offer to other system users.

Turning to a few of the specific questions asked.

# <u>1. Should the uncertainty of whether DC Ties will be exporting or importing be addressed in</u> <u>transmission planning?</u>

On the one hand, requiring analysis of the full range of possibilities adds unnecessary costs to the business plan of a DC tie planning primarily import or primarily export; on the other hand, failing to do

the analysis of all possibilities may leave undiscovered potential barriers to trade. I cannot say how those opposing issues balance out. However, recognizing the value that price-sensitive flows over DC ties offer to other market participants, the Commission may want to error on the side of a fuller analysis so as to uncover any hidden transmission concerns that would limit the DC from providing full value.

<u>4. Should the ERCOT Protocols be rewritten to allow DC Ties to be dispatchable? Issues to consider</u> <u>under current ERCOT Protocols (a) DC Ties are not dispatchable; and (b) The load on DC Ties cannot be</u> <u>changed by Security Constrained Economic Dispatch (SCED).</u>

As my emphasis on price-sensitive power flows over DC ties suggests, a great deal of the value of DC ties for other system users within ERCOT comes from having dispatchable DC ties integrated into ERCOT's market.

For many years power flows between the New York and New England ISOs operated based on market participant schedules. Frequently, due to changing conditions in one or both systems, power flows between the systems were economically perverse: with power flowing from the higher-priced area into the lower-priced area. It took many years, and repeated FERC directives, to spur market participants to reform market rules to enable more dynamic scheduling.

Frankly, among the reasons for delay is that some market participants benefited from the inefficiencies of the old system and were in no hurry for it to change. If ERCOT adds new large DC ties without the benefits of dispatchable flows and full market integration, then ERCOT too will see some market participants who will be in no hurry for the inefficient system to change. Complex issues are raised and each DC tie will have particular issues created due to its location and the power system it links to outside of ERCOT. Nonetheless, the Commission should endorse full market integration for DC ties.

As an aside, note that market power on the other side of the DC tie may raise market power concerns for the ERCOT market. Both the New York ISO and ISO New England maintain special rules governing operation of the large DC ties that connect those ISOs to the Hydro Quebec system. Connections to competitive markets do not create the same concerns.

5. Should a DC Tie owner be required to bear cost responsibility for transmission upgrades by TSPs that are required to accommodate power flows over the DC Tie? If so, to what extent?

Many of the comments filed in this proceeding indicated a preference for the current approach – import transactions provide reliability and economics benefits to other grid users and export transactions are subject to a separate charge used to offset ERCOT transmission costs. While the discussion of platform markets may suggest reasons for a somewhat differing cost structure – a cost structure *more* rather than *less* favorable to DC ties – recognizing the underdeveloped status of these ideas as applied in energy markets suggests treading carefully. Continuing with the current cost structure seems reasonable.

<u>6. The current ERCOT Most Severe Single Contingency (MSSC) is at about 1375 MW. If DC Ties greater</u> than 1375 MW were installed, it is expected that the ERCOT MSSC would likely increase. Assuming this happens and that this increase would require a larger operating Responsive Reserve Service (RRS): (a) Who should pay for the increased costs of the RRS? (b) How should increased costs be recovered?

Among the comments filed in the proceeding some also indicated a preference for the current approach, which does not allocate a specific cost burden to the entity contributing to the size of the current MSSC. Opinions were mixed, however, and given the potential change in the nature of the MSSC, perhaps ranging from losing a 3000 MW import to loss of 3000 MW export, it is an area for careful consideration. Any such consideration of potential added costs, however, should also involve consideration of the potential benefits the largest DC tie may offer.

#### **Conclusion**

I appreciate the opportunity to participate in today's workshop and your tolerance of these somewhat abstract remarks. The Commission has identified interesting and challenging questions concerning the terms of transmission access for a restructured power system with many features of platform markets.

I hope my participation in this proceeding proves helpful to the Commission as it carries out its responsibilities for overseeing the ERCOT system.

Thank you.

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