Implications for Consumers of the NOPR's Proposal to Pay the LMP for All Demand Response

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Summary

The Federal Energy Regulatory Commission has proposed a rule for compensation of demand response acting as a resource in the electricity energy market. The rule would pay the full Locational Marginal Price (LMP) for all types of demand response. This pricing rule would be appropriate in some cases and not in others. The analysis distinguishes among three general types of demand response.

- **Real-time Pricing Demand Response**. Consumers are paying the applicable LMP for their marginal consumption.

- **Explicit Contract Demand Response**. Consumers purchase a fixed quantity of electricity but consume less than the purchased amount and sell back the difference.

- **Imputed Demand Response**. Consumers have an estimated consumption baseline and the difference between actual consumption and the baseline is the imputed demand response.

The first two types of demand response have a straightforward framework for using the applicable LMP. However, the important case where the Commission's policy would be problematic is the likely ubiquitous circumstance of imputed demand response against an estimated consumption baseline. For this important case, full payment of the applicable LMP for the difference between actual consumption and the baseline would not be appropriate. The proposed rule would create an incentive for consumers to avoid real-time pricing and explicit contract demand response in preference for the higher net payments under imputed demand response. There would be further incentives to move generation behind the meter in the organized markets. The higher costs created would be born by other consumers less able to participate in the imputed demand response program, and would likely be unsustainable.

The Commission has available a number of alternatives that would better serve to support efficient demand response without creating perverse incentives or unintended consequences. The details would depend on many factors of electricity tariffs, but the essence would be to put the net payments for imputed demand response on an equal footing by emulating the payments under an explicit contract.

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Introduction

While many advances have been made in the development of competitive electricity markets in the decade since they were originally implemented, there remain aspects of those markets that are ripe for improvement. One such area is the treatment of demand response. There is little question that current market rules may give demand response providers incorrect incentives to consume electricity, and that as a result, the amount of demand response that is provided is inefficient. In its March 18, 2010 Notice of Proposed Rulemaking,[1] the Federal Energy Regulatory Commission ("FERC" or the "Commission") addresses this concern, by proposing standard rules for the compensation of demand response resources that would apply to all energy markets administered by Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs").

The Commission's proposed rule would pay the full LMP for all types of demand response in the energy market. The present paper addresses further the impacts of the Commission's proposed policy and demonstrates that the pricing rule would be appropriate in some cases and not in others. The analysis distinguishes among three general types of demand response.

- **Real-time Pricing Demand Response**. Consumers are paying the applicable LMP for their marginal consumption.

- **Explicit Contract Demand Response**. Consumers purchase a fixed quantity of electricity but consume less than the purchased amount and sell back the difference.

- **Imputed Demand Response**. Consumers have an estimated consumption baseline and the difference between actual consumption and the baseline is the imputed demand response.

The first two types of demand response have a straightforward framework for using the applicable LMP. However, the most important case where the Commission's policy would be problematic is the likely ubiquitous circumstance of imputed demand response against an estimated consumption baseline. For this important case, full payment of the applicable LMP would not be appropriate, but the Commission has available a number of alternatives that would better serve to support efficient demand response without creating perverse incentives or unintended consequences.

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[1] 130 FERC ¶61,213 (2010) ("NOPR").

The PJM proceeding subsumed by this NOPR included a paper submitted to the Commission as part of the filing by the Electric Power Supply Association.[2] The analysis in that paper continues to apply and is addressed to issues that appear again in the NOPR. As discussed further here, the Commission's proposal is grounded in a misunderstanding of the outcomes that one would expect to observe in markets in which all demand response resources were able to participate on an equal footing with generation. As a result, adoption and implementation of the proposed rule could produce outcomes that are inconsistent with economic efficiency. Certain consumers would be paid subsidies for reducing their consumption that exceed the payments that are necessary to induce them to consume electricity in an efficient manner. The cost of these subsidies would, in all likelihood, be shouldered by other consumers, who would thereby be charged amounts that are unrelated to the cost of the electricity they consume or any other service that is rendered to them.

The proposed rule may be unsustainable in the long run and thus not achieve the NOPR's demand response objectives. The increase in costs resulting from the need to pay for these subsidies will encourage consumers to purchase their electricity outside of the RTO- and ISO-administered markets—exactly the opposite of the behavior that the proposed rule was intended to encourage.

Supporting Efficient Demand Response

In its Order No. 719, the Commission asserted, "Improving the competitiveness of organized wholesale markets … is … 'integral to the Commission fulfilling its statutory mandate to ensure supplies of electric energy at just, reasonable, and not unduly discriminatory or preferential rates.'"[3] In this, there is no dispute. But the NOPR goes on to assert, "[I]ncreasing the aggregate amount of demand response resources in the organized wholesale energy markets will help to move prices closer to the levels that would result if all demand could respond to the marginal cost of energy."[4] This statement is made without any caveats, as though it must hold, regardless of how the increased amount of demand response participation was obtained. In fact, whether this statement is true depends critically on what measures were undertaken to increase the aggregate amount of demand response resources.

If demand response resources are unable to bid into the markets at prices that reflect the value they place upon the electricity they actually consume, or if they do not have the proper incentives to do so, consumers may consume electricity even though the cost of producing that electricity exceeds its value to those consumers. Alternatively, consumers may fail to consume electricity even though that electricity could be produced at a cost that is less than the value it would have had for those consumers. Either of these is an inefficient outcome with associated costs imposed on the economy and individual

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[2] William W. Hogan, Providing Incentives for Efficient Demand Response ("October White Paper"), Oct. 29, 2009, at 4-6, contained in Motion for Leave to Answer and Answer of the Electric Power Supply Association and White Paper by Professor William W. Hogan, Docket No. EL09-68-000, Oct. 30, 2009.

[3] NOPR at P 2, quoting FERC Stats. & Regs. P 31,281 (2008) (Order No. 719) at P 1.

[4] NOPR at P 18.

consumers. In such cases, removing barriers to participation by these resources, and providing those resources with incentives to submit bids that reflect the value they place upon the electricity they consume, can increase efficiency, and can yield prices that are "closer to the levels that would result if all demand could respond to the marginal cost of energy."

But actions that do not provide the correct incentives for well-defined demand response products may yield inefficient outcomes, contrary to the Commission's expectations, even if those actions happen to increase demand response participation in electricity markets. And the Commission's proposed rule would not provide incentives for demand response providers to submit bids that reflect the value they place upon the electricity they consume. It is therefore unlikely that the proposed rule would meet the Commission's stated objectives.

This result would occur because the proposed rule is based on a misunderstanding of how to pay for the demand response that is offered into the market and the role that LMP plays in RTO- and ISO-administered markets. In the NOPR, the Commission states, "It is well-established practice in the organized wholesale energy markets to rely on LMPs to encourage efficient behavior by market participants. The LMP represents the value of additional supply or reductions in consumption at each node within the RTO or ISO and, thus, reflects the marginal cost of the last unit necessary to efficiently balance supply and demand…."[5] But then the Commission goes on to claim:

> Given that the LMP represents the marginal value of the resource being used by the RTO or ISO to balance supply and demand, it follows that the LMP should be paid to any resource clearing in the RTO's or ISO's energy market. In balancing supply and demand, a one megawatt reduction in demand is equivalent to a one megawatt increase in energy for purposes of meeting load requirements and maintaining a reliable electric system. The ISO or RTO is able to avoid dispatching suppliers with higher bids, be they generation or demand response, by accepting a lower bid to either reduce consumption or increase generation.[6]

Consequently, the Commission has proposed a rule which would require "each Commission-approved ISO and RTO that has a tariff provision providing for participation of demand response resources in its energy market must pay demand response resources, in all hours, the market price for energy, i.e., full LMP, for demand reductions made in response to price signals."[7]

While electricity markets differ in many important respects from markets for other goods, there are some similarities. For example, in the market for shoes, there is no need to pay consumers for reducing the number of shoes they purchase in order to ensure an efficient

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[5] *Id.* at P 14 (footnote omitted).

[6] *Id.* at P 15.

[7] *Id.* at P 11.

solution. Instead, the market is able to perform this function without regulatory intervention. If the price for a pair of shoes is less than the marginal value of those shoes to a consumer, that consumer buys them. If not, the consumer does not buy the shoes. The market clears at a price that sets supply equal to demand. The result is efficient because consumers who are willing to pay more than the market-clearing price for shoes pay that price, while consumers who are not willing to pay the market-clearing price do not pay that price. This latter group is better off because, by not buying the shoes, they avoid paying the price of the shoes, and the price of the shoes exceeds the value they would have realized if they had purchased those shoes.

Similarly, if we assume that all consumers could respond to the marginal cost of electricity, and we also assume that all consumers pay the LMP for the electricity they consume, then every consumer would have both the ability and the incentive to consume electricity whenever the marginal cost of producing that electricity is less than the marginal value of that electricity to it, and not to consume electricity whenever the marginal cost of producing that electricity is greater than the marginal value of that electricity to it—without the need to make separate payments to consumers to induce them to reduce their consumption. The reason is that by not consuming electricity, the consumer avoids paying the LMP. Not paying the LMP leaves the consumer better off than if he or she had paid the LMP and consumed the electricity. So charging consumers the LMP is all that is needed to induce efficient behavior, given these assumptions.

Of course, in reality, the assumptions made above do not hold. Not all consumers have the ability to respond to the marginal cost of electricity, and of those consumers with that ability, not all pay the LMP. Consequently, there is a role for programs that expand the ability for consumers to participate actively in the market by eliminating barriers to participation by demand response providers. There is also a role for programs that give consumers better incentives to submit bids that reflect the value they place upon electricity, and to consume when the price is less than that value, while not consuming when the price exceeds that value. But mandating that all RTOs and ISOs pay the LMP to *all* consumers *all* the time for *all* demand reduction will not bring about this outcome.

There are many circumstances where full LMP would be the appropriate price in different ways for different types of demand response. The two general cases involve consumers facing real-time prices and consumers that have explicit contracts purchasing a given quantity of electricity and then deciding not to use some or all of the contracted amount that would be resold in the market. For the first case, consumers facing real-time pricing are charged LMP for the amount they actually purchase, and no further payments are necessary. These consumers see the correct incentive because they save the LMP for anything they do not consume. For the second case, consumers purchase a fixed quantity and pay for it under some explicit arrangement such as a forward contract or a day-ahead purchase, and then in effect settle up for differences of actual consumption from the contract quantity at the applicable LMP. These consumers see the correct incentive because they sell back at the LMP what they have purchased but not consumed.

However, the Commission proposal presumably would apply as well to a very different set of circumstances for consumers under full requirements tariffs at a fixed price but not

for a fixed quantity. For these consumers, imputed demand response involves neither charging them LMP for what they consumed nor paying them LMP for the difference between what they purchased and what they consumed. For these consumers there would be a procedure for estimating the baseline of what they would have consumed, and then paying them for the difference between the actual consumption and the baseline amount. But these consumers have not actually purchased the baseline amount. It is for this form of imputed demand response that the Commission's policy would be problematic.

Paying the LMP to all consumers all of the time for imputed demand reduction will generally yield an inefficiently large amount of demand reduction paid for by those consumers who remain. This can be seen most easily in the case of consumers who pay the LMP for the electricity they consume. If such a consumer does not consume electricity, under the proposed rule, not only would it not have to pay the LMP, but it would also be paid the LMP for electricity it does not consume. So, if we assume that the LMP is $40/MWh, the imputed demand response provider will have $2 \times \$40 = \$80$ more if it does not consume a MWh of electricity than if it consumes that MWh. In other words, the imputed demand response provider would be paid twice under the Commission's proposal.

The imputed demand response provider receives a double payment because it never purchased the electricity that the proposed rule would permit it to sell back to the RTO or ISO. As a result, under the proposed rule, it would receive the LMP for selling the imputed demand response, without having to pay for the right to consume that electricity in the first place. If it had paid for the baseline electricity, then paying the demand response provider the LMP for reductions in the amount of electricity it purchased would be entirely consistent with economic efficiency. But the proposed rule contains no such provisions. Most of the suggestions for implementing compensation in the case of imputed demand response can be seen as attempts to restore the equivalence with dynamic pricing or explicit contract purchases by charging for the imputed baseline purchases.

Unsurprisingly, this double payment can lead to inefficiently large amounts of imputed demand response, as demonstrated in an example in the October White Paper. In that example consumers at a given location wished to consume as much as 70 MWh of electricity, and that they valued the first 50 MWh of potential consumption at $200/MWh, and the next 20 MWh at $70/MWh. If consumers were paid the LMP (as under the proposed rule), they would consume only 50 MWh of electricity, and the LMP would be set by the $40/MWh cost of the generator that would be running in that example. Consumers would only consume 50 MWh because if they consumed more, they would have to pay $40 for each MWh of additional consumption, and they would also forego a $40/MWh payment they receive for reducing their consumption. The overall net cost of additional consumption under the Commission's proposed rule is $80 per MWh consumed, which exceeds the $70/MWh value to consumers of the additional electricity. However, the cost of generating additional electricity, $40/MWh, is much less than the $70/MWh marginal value that consumers place upon additional consumption. Therefore, the Commission's rule leads to an inefficiently high amount of imputed demand response, because it dissuades consumers from consuming electricity

even in cases where the cost of producing that electricity is less than the value of that electricity to consumers.

Instead, in order to promote market efficiency, demand response programs need to be targeted to situations where consumers may not have incentives to submit offers that reflect the value that they place upon the electricity they consume. Those programs should aim to modify those incentives so that such consumers have an incentive to act efficiently, instead of making payments indiscriminately to all consumers for reducing consumption while ignoring whether those consumers already have incentives to consume efficiently, and disregarding differences among consumers who do not have incentives to consume efficiently.[8]

How the Proposed Rule Would Affect Consumers

Aside from the impact on market efficiency, the proposed rule may also have significant and adverse effects on many consumers of electricity under various scenarios discussed below, which are discriminatory, and which simply may not be sustainable in the long term. To illustrate, consider another example in which we assume there are 1000 MW of price-insensitive load, so that the amount consumed will stay the same regardless of price. Since the load does not depend upon price, we do not have to worry about whether the imputed demand response program promotes more or less consumption than would be observed in a competitive, efficient market, because consumption is fixed. Also assume that there are more than 1000 MW of generation available to serve this load at a price of $50/MWh, and ignore transmission congestion, losses, minimum generation costs, and other complicating factors. Finally, assume that all consumers pay the LMP for all of the electricity they purchase from this RTO-administered market.

Before the introduction of any demand response program, the LMP is $50/MWh in this example, as that is the price where supply is equal to demand. Adoption and implementation of an imputed demand response program such as that contemplated by

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[8] As I noted in the October White Paper, some have argued that the LMP does not correctly reflect the cost of electricity, either because it does not fully incorporate the cost of environmental externalities, such as greenhouse gas emissions, or because it does not fully reflect the cost of shortages. These arguments should be addressed by other, broader-based measures that would ensure that generation and demand response compete on a level playing field. In contrast, procedures that are intended to supplement payments to demand response providers for these reasons without affecting payments to generation are likely to yield inefficient outcomes, because they discriminate against generation and in favor of demand response resources. *See* October White Paper at 7-9.

Additionally, as I also noted in the October White Paper, in certain circumstances, paying demand response providers more than the amount that is required to induce an efficient amount of demand response may be justified if the intent of such a program is to reduce the cost of providing demand response by spurring development of additional demand response resources. If it is unlikely that the developers of such demand response resources would be able to capture most of the benefits of their investments, underinvestment in demand response resources might result in the absence of such a payment. However, that argues for a limited, targeted program of payments to demand response providers—which might resemble many of the demand response programs currently implemented by RTOs and ISOs—and not the broad-based program that the proposed rule would mandate, which would make such payments to all demand response providers indefinitely. *See* October White Paper at 10-11.

the proposed rule will not induce a reduction in consumption in this example, because the value that consumers place upon the electricity they consume is, by assumption, very large. Suppose, for purposes of this calculation, that value is $10,000/MWh. Then consumers are $10,000 – 2 × $50 = $9900 better off if they consume electricity, pay the LMP for it (the first $50), and forego the $50 payment they would receive if they reduced consumption (the second $50) under the imputed demand response.

But simply because the consumers in this example plan to consume the same amount of electricity, no matter what the price, does not mean that they do not care what price they pay. Even if they do not plan to reduce their consumption in response to a demand response program, consumers still would like to minimize the net amount they pay for the electricity they consume. One way for at least some of them to do this is to move their consumption out of the RTO-administered market, thereby making it appear that they have reduced consumption. In reality, they have done no such thing, thus gaming the system.

Suppose in this example that a consumer with 100 MW of load is located next door to several 100 MW generators. An imputed demand response program such as that envisioned by the Commission gives the load and one of the generators an incentive to sign an agreement to take the generator "behind the meter," whereby that generator would provide electricity directly to serve the load.

In this case, the electricity would not flow into or out of the RTO-administered grid. Consequently, from the perspective of the RTO, there appears to have been a 100 MW reduction in load on the system, and an offsetting reduction of 100 MW in generation on the system. The supply and demand curves shift to the left by an equal amount, so the LMP remains $50/MWh.

It is likely that this consumer will pay about $50/MWh to the generator for the electricity it consumes under this agreement. It will not pay significantly less than $50/MWh because the generator can sell the electricity it produces into the market for $50/MWh. And it will not pay significantly more than $50/MWh because the consumer can contract to purchase electricity from other generators at about $50/MWh. But under the imputed demand response program, the consumer will receive the $50 LMP for each MWh of electricity that it no longer purchases from the RTO-administered market, because it *appears* to have reduced its consumption. Since it no longer purchases any electricity in that market, the demand response payments will fully (or almost fully) offset the payments it must make under its contract with the generator, and it pays little or nothing for the electricity it consumes. Therefore, the only significant cost this consumer may incur is the cost associated with moving the generation behind the meter.

Such a program may be lauded as a "success" that has produced a 10 percent reduction in electricity consumption, but in fact it has merely moved the consumption somewhere where it is not visible to the RTO. The consumer continues to consume 100 MWh of electricity, just as before, which is not to say that the program has not had any effects. First, it has induced the consumer to spend money to move the generation behind the meter. From a social perspective, this spending is wasteful, as it does nothing to promote

increased efficiency. But it benefits this individual consumer, as it ensures that its consumption will no longer be visible to the RTO, making it eligible for imputed demand response payments.

In addition, this program affects other consumers. The payments made to imputed demand response providers under this program must be recouped somewhere. Presumably, they will be recouped from the load that continues to purchase electricity in the RTO-administered market. The RTO would pay $50/MWh × 900 MWh = $45,000 for electricity that generators sell into its market, and another $50/MWh × 100 MWh = $5,000 to the consumer who appears to have reduced consumption, even though that consumer has simply moved its consumption behind the meter. Therefore, the total amount paid by consumers buying from the RTO-administered market will be $50,000, the same amount that was paid by consumers before 100 MW of generation and load moved behind the meter. But now 900 MW of load must cover all of the $50,000 in costs, so those consumers will pay $50,000 / 900 MWh = $55.56/MWh to the RTO, instead of $50/MWh, while the 100 MWh of load that moved its consumption out of the RTO-administered market pays little or nothing for its electricity.

Consumers who continue to purchase electricity from the RTO-administered market must pay not only the $50/MWh value of electricity generated for their own use, but another $5.56/MWh to cover the costs of the imputed demand response program (which are really the value of electricity consumed by other consumers). There is no justification for this disparate treatment of otherwise identical consumers. This treatment is therefore discriminatory.[9] The outcome would be quite different under dynamic pricing or resale of electricity under an explicit contract, where LMP is appropriate and the cost shifting of imputed demand response does not arise.

Moreover, such an imputed demand response program may also contain the seeds of its own demise, as the increase in costs that the remaining loads must bear may induce others to leave the system as well. The increase in the price of electricity from $50/MWh to $55.56/MWh that results from the need to recoup these demand response payments from the remaining consumers will give other consumers additional incentive to strike their own deals with generators to move behind their own meters. While the savings realized by those consumers as a result of such agreements might not have been large

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[9] Even if it were possible to recoup part of this cost from the 100 MW of unmetered load that is served by behind-the-meter generation, the charge would simply be reduced from $5.56/MWh to $5000 / 1000 MWh = $5/MWh. Consumers who purchase their electricity from the RTO-administered market would still have to pay $55/MWh, $50 to cover the cost of the electricity they consume, and $5 to cover the cost of the demand response program. The consumer whose load is served by behind-the-meter generation would pay a total of about $5/MWh consumed, as the amount it pays to the generator under the contract would be offset by the payments it receives from the demand response program. Therefore, other consumers would still bear most of the cost of the electricity consumed by the consumer served by behind-the-meter generation.

If the demand response program were structured so that all of its cost could be recouped from the entities who receive payments under the program, then the incentive for loads and generators to strike deals to take generation behind the meter would be eliminated.

enough to justify the cost of moving those generators behind the meter when each MWh of electricity consumed cost $50, those savings might be high enough to justify other such investments if each MWh of electricity consumed costs $55.56.

If the increase in electricity prices were to induce consumers with another 300 MW of load to reach agreements with 300 MW of generation to move behind their meters, then a total of 600 MW of load would continue to be purchased in the RTO-administered market. The LMP would remain $50/MWh, since the demand and supply curves would each shift another 300 MW lower.

Now the RTO would pay $50/MWh × 600 MWh = $30,000 for electricity purchased from generation, and another $50/MWh × 400 MWh = $20,000 to the consumers who appear to have reduced consumption, even though those consumers have simply moved their consumption behind the meter. The total amount paid by consumers buying from the RTO-administered market would still be $50,000, the same amount that was paid by consumers before any generation or load moved behind the meter. But now 600 MW of load that remains in the RTO-administered market would have to cover all $50,000 in costs, so those consumers would have to pay $50,000 / 600 MWh = $83.33/MWh to the RTO, instead of $50/MWh. The 400 MW of load that moved its consumption out of the RTO-administered market would continue to pay little or nothing, other than the cost of moving generation behind their meters.

Consumers who continue to purchase electricity from the RTO-administered market now would pay a $33.33/MWh surcharge to cover payments made to imputed demand response providers, in addition to the $50/MWh value of electricity generated for their own use. Again, this treatment is discriminatory, and there is no justification for this disparate treatment of otherwise identical consumers.[10]

The $83.33/MWh cost of electricity may induce yet more consumers to move generation behind their meters, leaving even fewer MWh of load to bear the $50,000 that the RTO must recoup from loads, and so on. The figure below illustrates the amount that the remaining consumers would need to pay to purchase their electricity from the RTO-administered market. As it shows, that amount grows at an increasing rate to the extent that the additional load deserts that market and contracts to be supplied with electricity provided by behind-the-meter generation, providing an accelerating incentive for even more consumers to desert the RTO-administered market.

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[10] In this case, if it were possible to recoup part of this cost from the 400 MW of unmetered load that is served by behind-the-meter generation, the charge would simply be reduced from $33.33/MWh to $20,000 / 1000 MWh = $20/MWh. Consumers who purchase their electricity from the RTO-administered market would still have to pay $70/MWh, $50 to cover the cost of the electricity they consume, and $20 to cover the cost of the demand response program. The consumers whose loads are served by behind-the-meter generation would pay a total of about $20/MWh consumed, as the amount they pay to the generators under the contracts would be offset by the payments they receive from the demand response program. Therefore, other consumers would still bear most of the cost of the electricity consumed by the consumers served by behind-the-meter generation.

Y-axis: Cost of Purchasing Electricity from the RTO-Administered Market ($/MWh)

X-axis: Electricity Purchased from the RTO-Administered Market (MWh)

Cost of Demand Response Program
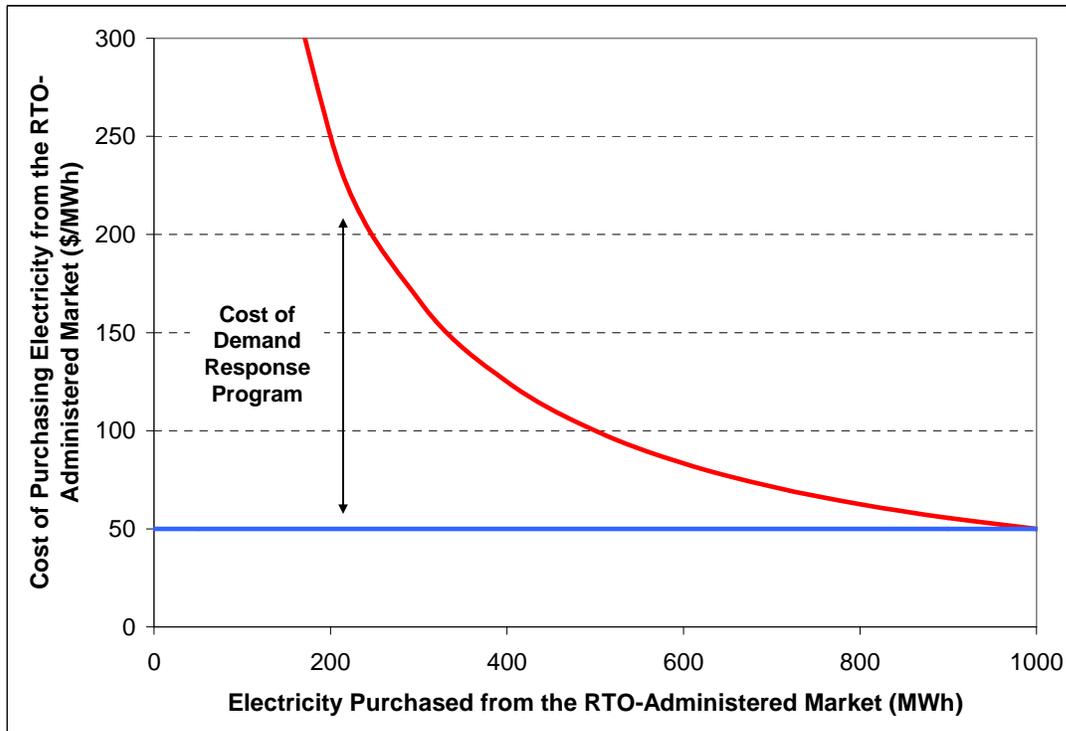
However, there are likely to be many consumers who simply do not have the capability to enter into these behind-the-meter arrangements and would continue to purchase their electricity in the RTO-administered markets. This group of consumers, which is likely to include load-serving entities selling to a disproportionately large number of residential and small commercial consumers whose operations are not of sufficient size and scope to make it worth their while to incur the fixed costs associated with moving generation behind the meter, must pay not only for electricity generated for their own use, but also for electricity generated for consumption by other (generally larger) consumers for whom moving generation behind the meter is cost-effective, since consumers who move generation behind the meter will pay approximately zero for their electricity. (That is because the contract payments they make for electricity purchased from behind-the-meter generation should call for the consumer to pay approximately the LMP for electricity consumed, so the LMP payments made under the demand response program should roughly offset the cost of the contract payments, as shown above in the example.)

The situation could be worse than in these examples that assume the generation is efficient. For example, consumers who have inefficient backup generators would have an incentive to run such equipment to burn diesel oil or natural gas at much higher heat rates and substitute for measured electricity load. As long as the inefficient generator costs less than the LMP plus the retail rate, the imputed demand response program would create an incentive for these inefficient generators to run.

Note that in all these examples, the perverse incentives and unintended consequences do not arise for real-time pricing demand response and explicit contract demand response.

By adopting the proposed rule as applied to imputed demand response, and mandating that all RTOs pay the LMP to all consumers who reduce the amount of electricity they purchase from RTO-administered markets, the Commission would be assuming that consumers would not respond to these incentives to move generators behind the meter or operate inefficient backup equipment. However, the Commission has not provided any evidence to support this assumption If the Commission's assumptions are incorrect, then the Commission-mandated imputed demand response programs could actually induce consumers and generators to stop participating in RTO-administered markets. This is not what this NOPR was intended to do. Instead, the NOPR asserted that facilitating participation by demand response resources would "help[] to increase competition in those markets."[11] By discouraging participation in RTO-administered markets, the imputed demand response programs that would be mandated by the proposed rule would likely increase costs due to the loss of efficiencies that are realized as a result of participation in a centrally dispatched LMP-based market (in addition to the fixed costs associated with moving generation behind the meter).

There is historical precedent for this result if the related market rules are not designed properly. In 1997, when PJM first began to operate its markets, the Commission mandated an approach to transmission pricing that gave market participants incentives to transact outside the PJM market. Under this approach, generators sold electricity at a hypothetical unconstrained price, and consumers purchased electricity at that price. Generators that were dispatched down due to transmission congestion were not compensated. However, those generators could evade these restrictions by self-scheduling transactions in which they would serve load. No congestion costs were charged in association with such transactions. As a result, generators that found themselves constrained from operating would self-schedule themselves to operate, which would cause other generators to be constrained off. Those generators then self-scheduled themselves as well. In the end, so many generators in PJM's western and central regions self-scheduled themselves that PJM found itself without any resources in those regions that it could dispatch downward, causing PJM to declare a minimum generation emergency (which permitted PJM to curtail transactions) on August 22, 1997, *during the system peak.*[12] Like the rule that the Commission mandated in 1997, the rule that the Commission proposes in this proceeding creates inconsistencies that gives market participants incentives to act outside the market. And, just as in 1997, if some market participants act on those incentives, that will create incentives for other market participants to act outside the market as well, creating the prospect that these incentives will snowball.

The central failing of the congestion management procedure that the Commission directed PJM to apply in 1997 was that it did not charge market-clearing prices for access to transmission facilities when those facilities were congested. By making it cheaper for generators to gain access to those facilities by self-scheduling than by bidding into the

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[11] NOPR at P 3 (footnote omitted).

[12] For another discussion of these events, see William W. Hogan, "Independent System Operator: Pricing and Flexibility in a Competitive Electricity Market," Feb. 1998, at 17-18, available at www.whogan.com.

market, the Commission made it impossible for PJM to use the market to allocate access to those facilities. Similarly, in this proceeding, by mandating subsidies that could make it cheaper for certain consumers to consume electricity if they purchase it outside the market than if they purchase it in the market, the Commission could make it impossible for RTOs and ISOs to operate their markets, if too many consumers elect to purchase their electricity outside those markets. The market rules in place in the RTO- and ISO-administered markets have, in general, been carefully crafted to give market participants incentives to act in a manner that is consistent with market efficiency. If the Commission now chooses to mandate procedures that are fundamentally inconsistent with market efficiency, the Commission runs the risk of undermining the operation of those markets in a manner reminiscent of 1997. The Commission should heed 1997's lesson and retract the proposed rule here in order to develop more tailored demand response requirements.

Price Reductions

An argument has been made that the inefficiencies and cost increases for remaining consumers could be justified or avoided by achieving price reductions in LMPs that would reduce the total payments by consumers. For example, in the PJM proceeding, Allen Freifeld provided an affidavit for the Demand Response Providers asserting that the imputed demand response program would provide "a price mitigation service to all load in the region."[13] The implication is that this price mitigation would be a policy that the Commission should support.

This price reduction argument has a superficial appeal, but it is misdirected for at least two reasons. First, it is not likely to work. Second, even if it worked for a while it would be bad policy.

The price reduction argument misses the impact it would have on other aspects of the electricity market, most visibly in the case of organized RTO/ISO markets with explicit capacity requirements or markets. As is well known, the various market monitors have consistently reported that the energy and ancillary services payments have not been sufficient to support new investment in generating capacity. This has led to various policies, such as capacity markets, designed to provide direct or indirect payments to capacity (for both generation capacity and demand response capacity) that are intended to make up the missing money. Hence, the net effect of reducing average LMPs and payments in the energy market would be to increase payments through the capacity mechanisms. In principle, these would be dollar for dollar, at least in the long run, and the putative reduction in payments by load would be an illusion. What would be real would be the spreading of capacity payments over different consumers and different hours that would mute rather than reinforce demand response incentives. As a result, it is more likely that real costs and total payments would go up, not down.

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[13]   Comments and Protest of Demand Response Supporters, Docket No. EL09-68-000, Sept. 16, 2009, Att. C (Affidavit of Allen M. Freifeld on Behalf of Demand Response Supporters) at 5.

Even for cases where there is not an effective capacity market, or where the short run capacity payments are fixed and there is a temporary opportunity to suppress energy prices, this form of "benefit" would not be economically efficient and would not be an appropriate policy for the Commission. In effect, this price mitigation service is not a policy to move towards a more competitive and efficient market. Rather, it would be an application of regulatory authority to enforce a buyers' cartel. The price mitigation policy would not be improving efficiency. To the contrary, it would be employing government authority to transfer income from producers to consumers. Thus the pursuit of price mitigation of this type would run contrary to the Commission's policy of supporting and facilitating efficient, non-discriminatory electricity markets.

Efficient Demand Response Policy

The Commission's proposed rule does not distinguish between consumers who pay the LMP for the electricity they consume and consumers who pay fixed prices for their electricity, but this distinction is crucial. As I explained above, consumers paying the LMP already have incentives to consume electricity in a manner that is consistent with economic efficiency. They do not need to be paid LMP, or any other amount, in order to provide them with such incentives. Therefore, demand response programs with added payments that are intended to encourage consumers to consume efficiently should not apply to them.[14]

On the other hand, consumers paying fixed prices for electricity generally do not have incentives to consume efficiently. A consumer who pays a fixed price to consume electricity that is less than the LMP at its location at a given time has less of an incentive to reduce its consumption of electricity than does a consumer that pays the LMP, since the consumer who pays the LMP will save more if it reduces consumption. Likewise, a consumer who pays a fixed price to consume electricity that is more than the LMP at its location at a given time has more of an incentive to reduce its consumption of electricity than does a consumer that pays the LMP, since the consumer who pays the LMP will save less by reducing its consumption. This is the reason why the proposed PJM demand response program, which was the focus of the October White Paper, differentiated between demand reduction provided by consumers who pay the LMP for the electricity they consume, and demand reduction provided by consumers who do not. Consumers who paid the LMP for the electricity they consumed were, in most hours, ineligible for payments under that program.[15] Consumers who did not pay the LMP were eligible.

Consequently, if the Commission deems it necessary to mandate that RTOs and ISOs implement imputed demand response programs with certain standardized characteristics, any such programs should be limited to consumers who pay a fixed price for the

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[14] As discussed in footnote 8 above, it is possible that such consumers might be included in demand response programs whose intent is to reduce the cost of providing demand response by spurring development of additional demand response resources.

[15] PJM did propose to make payments to consumers who pay the LMP during the nine percent of hours with the highest LMPs. I recommended against this aspect of PJM's proposed demand response program. *See* October White Paper at 18-19.

electricity they consume that differs from the LMP, as it is only these consumers who may have inefficient incentives to consume electricity. Furthermore, the intent of any such programs should be to restore the incentives for economically efficient behavior that would exist if those consumers were paying LMP. This would, in almost all circumstances, entail a payment to these consumers that is less than the payment of the full LMP that would be mandated by the proposed rule.

For example, suppose that in a given RTO-administered market, the LMP at a given location and time is $60/MWh, and there are three consumers at that location, each of which can reduce its consumption in response to price signals. Consumer A pays the LMP for the electricity it consumes, Consumer B pays $50/MWh for the electricity it consumes, and Consumer C pays $40/MWh for the electricity it consumes. The payments that should be made to each of these consumers to ensure they have incentives to act in an economically efficient manner differ because these consumers' circumstances differ.

- Consumer A should not receive any payments for demand reduction. It already has an incentive not to consume electricity if the value it places upon consuming that electricity is less than the $60/MWh marginal cost of consuming electricity.

- Consumer B should receive a payment of $10/MWh for demand reduction. It pays $50 for each MWh of electricity it consumes, so if it is paid $10 whenever it reduces its consumption of electricity by 1 MWh, the total financial impact of consuming an additional MWh would be the $50 it must pay for the electricity it consumes plus the $10 payment it would forego as a result of not having reduced its consumption, for a total of $60. Therefore it would have an incentive to consume electricity if it values that consumption at more than $60/MWh, and it would not have an incentive to consume electricity if it values that consumption at less than $60/MWh. These are the same incentives that apply to Consumer A, and they are consistent with economic efficiency.

- Consumer C should receive a payment of $20/MWh for demand reduction, in which case the total financial impact of consuming an additional MWh would be the $40 it must pay for the electricity it consumes plus the $20 payment it would forego as a result of not having reduced its consumption, which once again totals $60. Therefore, Consumer C, like Consumers A and B, also would have an incentive to consume electricity if it values that consumption at more than $60/MWh, and would not have an incentive to consume electricity if it values that consumption at less than $60/MWh.

By contrast, the Commission's proposed rule would require that each of these consumers receive a $60/MWh payment for imputed demand reduction. In each case, such a payment may induce the consumer to reduce its consumption of electricity by a larger amount than is economically justified. Inefficiency would result, because it would be possible to provide these consumers with additional electricity at a cost that is less than the value they place upon that electricity, but those consumers would choose not to consume that electricity so as not to forego the demand response payments.

In fact, the only circumstance in which an imputed demand response payment of LMP is economically justified is when the fixed price that a consumer pays is zero. In such cases, paying consumers the LMP for imputed demand reduction would give them the same incentives to consume that apply to consumers who pay the LMP for the electricity they consume. However, the number of consumers who pay a fixed price of zero for the electricity they consume is likely to be very small.

Implementation

Implementing appropriate compensation for demand response would be simple in the case of consumers with real-time pricing or an explicit contract for a fixed quantity. In these cases consumers would be charged at the applicable LMP for what they consume or paid the applicable LMP for the amount purchased through the contract and sold back as demand response.

In the case of imputed demand response, payment for the difference between the actual consumption and the baseline could take several forms. All the various options have the feature of adopting a net payment which would emulate the net payment under an explicit contract for a fixed quantity. Doing this through the price for imputed demand response would fall under the type of LMP for the demand reduction minus some proxy for the purchase of the baseline (at price G) for a net payment of LMP – G. The details would depend in part on the form of the consumer tariff, but the general structure would be the same.

An alternative to using the implicit demand response price would be to create an effective purchase and sale of the imputed demand response amount. The October White Paper contained a mechanism for implementing such an imputed demand response program.[16] Briefly, each imputed demand response transaction would be unbundled into an electricity purchase and an electricity sale. The estimated amount of demand reduction that has been provided would still be equal to the difference between baseline and actual consumption. This quantity difference would be deemed to have been purchased by the consumer under whatever arrangements the consumer purchases from the system. It would be added to the metered electricity purchases of the consumer or its load-serving entity. Separately, the same quantity would be sold to the RTO or ISO by the consumer at the LMP, as with any other spot market electricity sale, and as envisioned under the proposed rule.

A consumer who pays a fixed price for electricity would pay that fixed price for the right to consume its baseline level of consumption. It would also receive the LMP for any reductions in consumption relative to that baseline. Consequently, it would realize the difference between the LMP and the fixed price for the electricity that it was entitled to consume at the fixed price, but which it did not consume. Such a program would provide the same incentives for efficiency as the demand response program with an explicit contract. It would provide those incentives by recognizing that the consumer could

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[16] October White Paper at 19-21.

purchase electricity at a price that differs from the LMP, thereby giving that consumer an incentive to consume an inefficient amount of electricity, but it also provides those incentives by ensuring that imputed demand response providers are not able to sell something they did not buy. The very essence of imputed demand response programs is that but for the actions of the consumer, electricity would have been purchased and consumed. It is this deemed electricity purchase that is presumably being sold to the system operator. The separation of the transaction into a purchase and a sale clarifies the underlying economics and makes it clear that in order to provide incentives for an economically efficient amount of demand response, imputed demand response providers must be charged for the electricity they would have consumed, in addition to being paid the LMP for not actually consuming that electricity.

This unbundling approach has a number of attractive features. It avoids the necessity for the RTO/ISO to estimate "G," the proxy for the purchase which the MISO calls the Marginal Foregone Retail Rate (MFRR), that could be different for different consumers at the same location. It raises no new jurisdictional issues as the transaction could be structured through the wholesale purchases of the load serving entity and essentially the same way as forward contracts to purchase more than actually consumption are settled at the LMP. And it would provide incentives for the local jurisdictional entities and regulators to allocate the costs to the ultimate imputed demand response provider to avoid cost shifting and preserve efficient incentives.

Conclusion

The NOPR is based on the premise that it is necessary to pay demand response providers the LMP for all demand reductions in order to place generation and demand response on a level playing field, but this premise is mistaken. Instead, to create a level playing field, it is only necessary to make demand response payments to consumers who do not pay the LMP for the electricity they consume, and who as a result may not have incentives to consume efficiently without such payments, and even those payments should, in almost all circumstances, be less than the LMP. Because the demand response programs that the proposed rule would mandate would make payments to some demand response providers when such payments are unnecessary to induce efficient behavior, and would make payments to other demand response providers that exceed what is needed to induce efficient behavior, they would not "move prices closer to the levels that would result if all demand could respond to the marginal cost of energy,"[17] as the Commission intends. Instead, the proposed rule would encourage inefficiently large amounts of imputed demand response. The cost of payments made to participants in these demand response programs would be borne by consumers who are unable to participate in these programs. Consequently, these consumers would be asked to pay not only the cost of purchasing electricity for their own use, but also payments made to other consumers, which could induce those consumers to engage in strategies to move their consumption out of RTO- or ISO-administered markets, thereby creating the illusion of a reduction in consumption. These costs would be likely to fall disproportionately on smaller consumers. Moreover,

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[17] NOPR at P 18.

the demand response programs that the proposed rule would mandate may simply be unsustainable, in that they may provide incentives for enough consumers to transact outside the RTO- and ISO-administered markets that the costs for the remaining consumers become untenable. Instead, the Commission should focus upon compatible demand response programs, which would address those specific circumstances when consumers in a given organized market do not have an incentive to act efficiently, and which would provide incentives in those circumstances that are appropriate given the incentives for inefficient behavior that apply to each consumer.