

**Demand Response Compensation,  
Net Benefits and Cost Allocation:  
Preliminary Comments**

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# **Demand Response Compensation, Net Benefits and Cost Allocation: Preliminary Comments**

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## **Introduction**

The Federal Energy Regulatory Commission's Supplemental Notice of Proposed Rulemaking (NOPR) addresses the question of proper compensation for demand response in organized wholesale electricity markets.<sup>1</sup> Assuming that the Commission would proceed with the proposal "to require tariff provisions allowing demand response resources to participate in wholesale energy markets by reducing consumption of electricity from expected levels in response to price signals, to pay those demand response resources, in all hours, the market price of energy (also referred to as the 'locational marginal price' or 'LMP') for such reductions,"<sup>2</sup> the Commission posed questions about applying a net benefits test and rules for cost allocation.

There is now an extensive record in this matter, and I have written on the various issues.<sup>3</sup> The purpose of the present paper is to summarize critical points and pose implications for the issues of net benefit tests and cost allocation. The limited time of the technical conference format dictates a certain brevity, referring to the prior submissions for a fuller exposition. My comments highlight several questions: Why are we here? Why is this subject so confusing? Why are retail rates relevant? How can we match ends and means? Do we need a net benefits test? How should we allocate costs? Where should we go from here?

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<sup>1</sup> Federal Energy Regulatory Commission, "Demand Response Compensation in Organized Wholesale Energy Markets," Supplemental Notice of Proposed Rulemaking, Docket No. RM10-17-000, Washington DC, August 2, 2010.

<sup>2</sup> FERC Supplemental Notice, pp. 1-2.

<sup>3</sup> William W. Hogan, "Demand Response Pricing in Organized Wholesale Markets," Prepared for ISO/RTO Council Comments on Demand Response Compensation in Organized Wholesale Energy Markets, Notice of Proposed Rulemaking, Federal Energy Regulatory Commission, Docket No. RM10-17-000, ("IRC"), May 13, 2010 (available at [www.whogan.com](http://www.whogan.com)). William W. Hogan, "Implications for Consumers of the NOPR's Proposal to Pay the LMP for All Demand Response," Prepared for Electric Power Supply Association Comments on Demand Response Compensation in Organized Wholesale Energy Markets, Notice of Proposed Rulemaking, Federal Energy Regulatory Commission, Docket No. RM10-17-000, ("EPSA II"), May 12, 2010 (available at [www.whogan.com](http://www.whogan.com)). William W. Hogan, "Providing Incentives for Efficient Demand Response" ("EPSA I"), 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 (available at [www.whogan.com](http://www.whogan.com)). Charles J. Cicchetti and William Hogan, "Including Unbundled Demand-side Options in Electric Utility Bidding Programs," *Public Utilities Fortnightly*. June 8, 1989, pp. 9-20.

The Commission's Supplemental NOPR did not address the underlying arguments presented in response to the original NOPR in this matter. But many of the basic issues in considering net benefits tests and cost allocation arise from the fundamentals that the Commission should address. Despite the important role that LMP plays in successful market design, the Commission should not assume that paying LMP is always appropriate.

## Why are we here?

Success of electricity restructuring depends to a large extent on the success of electricity market design in organized wholesale electricity markets. Good electricity market design requires consideration of how the many pieces fit together, and how well they all follow from a coherent set of principles that provide an organizing framework guiding the complicated orchestration of details.

The basic framework I have in mind is an efficient market emulating the competitive ideal of welfare maximization through the short-term structure of bid-based-security-constrained-economic-dispatch with financial transmission rights and the associated long-term incentives created by the anticipation of this sequence of short-term markets going forward.

An important part of that framework is participation of demand responding to incentives to manage short-term load and invest for greater long-term savings. It is widely recognized that there is more potential for better demand response.<sup>4</sup>

The Commission's demand response compensation proposal inevitably interacts with this larger framework. However, the proposal as it stands is inconsistent with the framework and asymmetric in its treatment of other resources for providing capacity and energy.<sup>5</sup>

## Why is this subject so confusing?

In his NOPR reply comments, Alfred Kahn refers "...to the proposition—in principle indisputable—that demand response (DR) is in all essential respects economically equivalent to supply response; and that economic efficiency requires, as the NOPR recognizes, that it should be rewarded with the same LMP that clears the market. Since DR is actually—and not merely metaphorically—equivalent to supply response, economic efficiency requires that it be regarded and rewarded, equivalently, as a resource proffered to system operators, and be treated equivalently to generation in competitive power markets."<sup>6</sup> This is an important premise, critical to the Commission's proposal. Were it true, the present proceeding would not be necessary. But it is not true.<sup>7</sup> The "negawatt" of demand response is a powerful metaphor, but a negawatt is not equivalent

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<sup>4</sup> William W. Hogan, "On an 'Energy Only' Electricity Market Design for Resource Adequacy," Harvard University, September 23, 2005 (available at [www.whogan.com](http://www.whogan.com)).

<sup>5</sup> Hogan, EPSA I, pp. 2-3; EPSA II, pp. 2-6; IRC.

<sup>6</sup> Alfred E. Kahn, Affidavit attached to "Reply Comments of the Demand Response Supporters," Docket No. RM10-17-000, August 30, 2010, p. 2. (footnote in original omitted)

<sup>7</sup> Hogan, EPSA I, pp. 13-19.

to a megawatt. The two have features in common, but they are not the same physically or economically. Useful application of the negawatt idea requires care in the analysis.

Amory Lovins, originator of the “negawatt” idea,<sup>8</sup> has been quoted as saying that he takes economics “seriously, not literally.”<sup>9</sup> This is good advice, and it would apply as well to the design of compensation rules for providing demand response through providing negawatts. Taking negawatts and demand response seriously is good policy. Building a demand response policy on a literal application of the “negawatt” metaphor produces contradictions and conundrums.

The fundamental contradictions and conundrums center on the difference between reselling something that you have purchased and selling something that you would have purchased, without actually purchasing it. If the something is a kilowatt-hour of electricity, the two conditions are physically identical in providing negawatts, but they are fundamentally different in economic terms. The former kind of demand response is easy to accommodate and price as the Commission has proposed, and the latter requires more care in the design of the compensation mechanism.<sup>10</sup>

## Why are retail rates relevant?

The Commission has responsibility for wholesale market rates and there is an argument by some that the Commission should set efficient wholesale rates without concern for the effect or inefficiencies of retail rates, with responsibility for improving retail rates lying elsewhere.<sup>11</sup> This is in part a jurisdictional argument and in part an appeal for simplicity in achieving efficient outcomes without worrying about the complexity of dealing with “second best” conditions that require some care in designing the appropriate compensation method.

However, the challenge of setting appropriate demand response compensation inherently includes a consideration of retail rates. Viewed narrowly from the confines of the wholesale market alone, and accepting wholesale demand as representing the traditional demand curve for electricity, the first-best solution would be to apply real-time pricing at the LMP to all megawatt-hour purchases, as is already done, and there would be no need for demand response programs. Likewise, if we had real-time pricing for all customers, we would not need demand response programs.<sup>12</sup> Hence, if we acted as though we could ignore retail rates, the simple solution would not be that we would pay LMP for demand response. Under this stylized assumption, the solution would be to charge LMP for actual consumption and to have no other demand response program at all.

The whole point of special demand response programs is that retail rate structures intervene and we cannot accept the resulting demand presented to the wholesale market

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<sup>8</sup> Amory B. Lovins, “Saving Gigabucks with Negawatts,” *Public Utilities Fortnightly*, Vol. 115, No. 6, Mar. 21, 1985, p. 24.

<sup>9</sup> Elizabeth Kolbert, “,” *The New Yorker*, Vol. 82 No. 46, January 27, 2007, p.34.

<sup>10</sup> Hogan, EPSA I, especially discussion of unbundled transactions, pp. 21-13

<sup>11</sup> Kahn, pp. 3-4.

<sup>12</sup> Hogan, EPSA I, pp. 15-16; EPSA II, pp. 4-5.

as representing the full demand curve. We are looking through the retail tariff and recognizing the lack of incentive to reduce consumption when prices are high, precisely because the retail tariff intervenes.

There are many ways to deal with this problem of unwinding the effect of the retail tariff to produce hybrid pricing schemes. One method would be to emulate purchase and resale through unbundled transactions where the putative amount of demand response negawatts are added to the megawatt provider's bill and paid for under whatever retail arrangements apply. Even better would be to have an explicit contract for stated volumes that would be consumed or resold. Under these arrangements, payment for the negawatts at LMP would be indicated. But many other hybrid mechanisms would be workable, all of which have the property of netting out an estimate of the retail tariff impact.<sup>13</sup> The one approach that is not indicated is what the Commission proposes, unless the retail arrangements would price the electricity at zero.

## **How can we match ends and means?**

There are many benefits of demand response and many reasons to support demand response programs. The environmental effects of negawatts are different than those of megawatts from fossil generation. Infant industry arguments might apply to launching the demand response industry, and learning-by-doing benefits could justify out-of-market support for demand response programs. To the extent that these are the goals, the nature of the benefits has an impact on the design of the program.<sup>14</sup> For example, environmental premiums would apply to all sources in a symmetric way, and not be limited to demand response programs.

The Commission's stated objective is to improve efficiency of electricity markets. But to the extent that this is the purpose, the design of demand response compensation would follow the framework of the various proposals that net out the effect of retail tariffs. Matching the means to the end would lead to a different means than paying LMP for all demand response.

Articulation of the objectives of the policy and design of the program means are especially important in the case of a putative benefit cited often as a main justification for demand response compensation. This is the impact of demand response on equilibrium electricity prices in the short-run market. Many of the various filings in this matter take for granted that reducing electricity prices is a benefit and a worthy objective that the Commission should support through out of market purchases of demand response. This argument is wrong for at least two reasons.

First, most of the effect of the putative reduction in electricity price is a transfer payment from generators to customers. From the perspective of the customers, this appears to be a benefit. But from the perspective of generators, this is a cost. From the perspective of economic efficiency and welfare maximization, the aggregate effect is a wash, and there

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<sup>13</sup> Hogan, EPSA I, pp. 19-21; EPSA II, pp. 15-16; IRC, pp. 7-8. Cicchetti and Hogan.

<sup>14</sup> Hogan, EPSA I, pp. 1-2.

is no net benefit.<sup>15</sup> To the extent the Commission's proposal depends on the "benefits" of price reduction, the policy amounts to no less than "an application of regulatory authority to enforce a buyers' cartel."<sup>16</sup> The Commission has been vigilant and aggressive in preventing buyers and sellers from engaging in market manipulation to influence prices. It would be fundamentally inconsistent for the Commission to design demand response compensation policies in order to coordinate and enforce such price manipulation.

Second, in the long-run the benefit would be illusory. As we know from the extensive discussion surrounding resource adequacy and capacity markets, overall electricity prices have been too low, not too high. Any program that seeks to suppress energy prices will have unintended consequences, such as lowering energy prices but only increasing capacity market prices by a similar amount.<sup>17</sup>

## Do we need a net benefits test?

With efficient pricing of demand response, there would be no need for a net benefits test. But for any other compensation mechanism, a net benefits test could be part of a package of rules and incentives that would mitigate the harm. A clear lesson of experience with restructured electricity markets is that any rules or pricing procedures which are inconsistent with the basic framework of economic dispatch would create opportunities and incentives for exploiting the market inefficiencies. Early market designs in PJM, New England, California, and ERCOT all were based on the notion that inefficient pricing rules could survive in an environment of open access and individual discretion in purchases and sales.<sup>18</sup> However, market participants respond to incentives, even when the incentives are not consistent with efficient operation. These early designs were abandoned and replaced with pricing mechanisms that conformed to the principles of economic dispatch. Hence, some rules and constraints will be required to undo or prevent the worst effects of poor market design, or the poor market design will have to be reformed.

The need for a net benefits test arises precisely because a poorly designed demand response compensation system could do more harm than good.<sup>19</sup> In the best case, the net benefits test would be crafted to eliminate those cases of demand response that would not be supported by efficient compensation rules. This might be too ambitious, and raises immediately the question of why not adopt an efficient compensation rules from the start. At a minimum, however, a net benefits test should ensure that the demand response program does not have negative net benefits compared to no program at all. The criterion

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<sup>15</sup> Hogan EPSA I, pp. 5-8.

<sup>16</sup> Hogan, EPSA II, p. 38.

<sup>17</sup> Hogan, EPSA II, p. 37.

<sup>18</sup> William W. Hogan, "Electricity Market Restructuring: Reforms of Reforms," *Journal of Regulatory Economics*, Kluwer Academic Publishers, Vol. 21, No. 1, 2002, pp. 103-132.

<sup>19</sup> Robert L. Borlick, "Pricing Negawatts," *Public Utilities Fortnightly*, August 2010, pp. 14-19, ([www.fortnightly.com](http://www.fortnightly.com)). Hung-Po Chao, "Demand Management in Restructured Wholesale Electricity Markets", ISONE, May 20, 2010, (available at [http://www.hks.harvard.edu/hepg/Papers/2010/Chao%20-%20Demand\\_Management\\_in\\_Restructured\\_Wholesale\\_Electricity\\_Markets\\_5-20-2010.pdf](http://www.hks.harvard.edu/hepg/Papers/2010/Chao%20-%20Demand_Management_in_Restructured_Wholesale_Electricity_Markets_5-20-2010.pdf).)

to apply would focus on the bid-cost savings of generation and load, with the load bids adjusted for the effects of avoidance of the retail rate. Note that this is not the same as the measuring the change in the price of electricity, which by itself does not provide net benefits.

Given inefficient pricing of demand response, the incentives for market participants will be to obfuscate the transactions. Crafting and implementing an effective net benefits test would be an administrative challenge, but in principle it could be done.

## How should we allocate costs?

As discussed by Chao, cost allocation would not be an issue for the various first-best contracting implementations of demand response.<sup>20</sup> If the purpose is to achieve more efficient demand response, but there is an inefficient compensation scheme, such as paying the full LMP, then there will be a cost to allocate. This may also be true if there is efficient pricing but no implicit or explicit contracting relationship. In either case, the principal beneficiary would be the load serving entity otherwise responsible to meet the energy needs of the customer. The costs of the program should be allocated to the load serving entity. For efficient pricing, this cost allocation would emulate the effect of a contract and leave the load serving entity no worse off than without the demand response transaction.

If the purpose of demand response goes beyond removing the barriers for efficient market participation, such as to capture other environmental benefits or the future cost reductions of learning-by-doing, part of the cost recovery would be separate from the allocation to the load serving entity. In this case the benefits would presumably be widely shared, and the costs should be recovered from a broader group, typically all loads. The principle lesson from the stranded cost experience is that such policy-benefit charges should be imposed on the wires and made non-bypassable in order to minimize the perverse incentive effects.

## Where should we go from here?

Special demand response programs provide a means to work around the failure to offer customers dynamic prices that reflect the real costs of electricity. Efficient demand response programs could be approximated in many ways, but these programs would pay full LMP only under certain circumstances. Although it is always seen as politically difficult, an important task is to confront the problem directly and avoid the need for special demand response programs. Smarter pricing, smarter meters, and smarter default options for retail customers would provide better incentives and support the transformation of the electricity sector that are likely to be necessary to meet the challenges of the future.<sup>21</sup> The Commission's work under Order 719 on scarcity pricing

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<sup>20</sup> Chao, p. 13.

<sup>21</sup> Ahmad Faruqi, "The Ethics of Dynamic Pricing," *The Electricity Journal*, Vol. 23, Issue 6, July 2010, pp. 13-27. William W. Hogan, "Fairness and Dynamic Pricing: Comments," *The Electricity Journal*, Vol. 23, Issue 6, July 2010, pp. 28-35. Ahmad Faruqi, Ryan Hledik, and Sanem Sergici., "Rethinking Prices," *Public Utilities Fortnightly*, January, 2010, pp. 31-39. ([www.fortnightly.com](http://www.fortnightly.com))

is important, and should be a high priority in conjunction with promotion of the smart grid.<sup>22</sup>

## Endnote

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<sup>22</sup> See the discussion in PJM Interconnection. L.L.C., Docket No. ER09-1063-004 (Compliance Filing), June 18, 2010. <http://www.pjm.com/~media/documents/ferc/2010-filings/20100621-er09-1063-006.ashx>.