Demand Response Compensation in	)	Docket No. RM10-17-___
Organized Wholesale Energy Markets	)	

MOTION TO LODGE OF THE CALIFORNIA INDEPENDENT
SYSTEM OPERATOR CORPORATION

Pursuant to Rule 212 of the Rules of Practice and Procedure of the

Federal Energy Regulatory Commission ("Commission"), 18 C.F.R. § 385.212

(2010), the California Independent System Operator Corporation ("ISO") hereby

moves to lodge in this proceeding an opinion of the ISO's Market Surveillance

Committee issued on June 6, 2011,[1] attached hereto as Exhibit A, as well as a

concurring opinion by Steven Stoft of the Market Surveillance Committee issued

on June 6, 2011,[2] attached hereto as Exhibit B.

I.   BACKGROUND

In response to *Demand Response Compensation in Organized Wholesale*

Energy Markets, Order No. 745, FERC Stats. & Regs. ¶ 31,322, 76 Fed. Reg.

16658 (2011) ("March 15 Rule"), the ISO filed a motion for clarification and

request for rehearing on April 14, 2011. In support of that motion, the ISO

provided a draft opinion of the Market Surveillance Committee which discussed

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[1]   Market Surveillance Committee of the California ISO, *Opinion on Economic Issues Raised by FERC Order 745, "Demand Response Compensation in Organized Wholesale Energy Markets,"* June 6, 2011.

[2]   Steven Stoft, Member, Market Surveillance Committee of the California ISO, *Concurring Opinion on Economic Issues Raised by FERC Order 745, "Demand Response Compensation in Organized Wholesale Energy Markets,"* June 6, 2011.

several aspects of the March 15 Rule that it found potentially very detrimental to the efficiency and competitiveness of wholesale electricity markets.

The procedures followed by the Market Surveillance Committee require that a draft opinion be posted before it can be finalized. In its April 14 motion for clarification, the ISO stated that it would supplement that filing with the final opinion of the Market Surveillance Committee.[3] The Market Surveillance Committee determined that it was appropriate to issue a more comprehensive opinion addressing issues related to the March 15 Rule. On June 6, 2011, the attached opinion was adopted at a Market Surveillance Committee teleconference. Additionally, during the same teleconference, the Market Surveillance Committee officially noted the concurring opinion of Dr. Stoft. Consistent with the commitment made in the April 14 motion, the ISO moves that the Commission include the attached documents in the record in this proceeding.

II.   MOTION TO LODGE

The Commission may grant a motion to lodge where "the material presented may be helpful to [its] consideration of the matters raised in [a] proceeding."[4] The ISO's April 14 motion for clarification discussed a number of significant economic issues with elements of the March 15 Rule. The Market Surveillance Committee opinion and Dr. Stoft's concurring opinion provide a fuller, more detailed analysis of these economic issues, as well as provide further information on the likely results of the rule's implementation. This more thorough

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[3]   *See* April 14, 2011, motion of the ISO at p. 7 n.8.

[4]   *Louisiana Energy & Power Auth. v. Cent. Louisiana Elec. Co.*, 54 FERC ¶ 61,236, 61,697 (1991); *see also The Salt River Project Agric. Improvement Power Dist. v. Tucson Elec. Power Co.*, 79 FERC ¶ 61,336, 62,452 (1997) (granting motion to lodge where "information . . . is relevant to our consideration").

analysis will aid the Commission in considering the matters raised in this proceeding, as well as in developing and implementing successful demand reduction measures.

III.   CONCLUSION

For the reasons set forth above, the ISO respectfully requests that the Commission grant its motion to lodge the attached Market Surveillance Committee opinion and the concurring opinion and fully consider this additional information in its decision-making in this proceeding and in ruling on the ISO's April 14 motion.

Respectfully submitted,

/s/ Sean A. Atkins

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Exhibit A

<u>FINAL</u>

Opinion on Economic Issues Raised by FERC Order 745,
"Demand Response Compensation in Organized Wholesale Energy Markets"

by

James Bushnell, Member
Scott M. Harvey, Member
Benjamin F. Hobbs, Member
Steven Stoft, Member
Market Surveillance Committee of the California ISO

June 6, 2011

1. Introduction

On March 15, 2011, the Federal Energy Regulatory Commission released Order 745. The purpose of the Order was to require that demand response (DR) resources participating in RTO or ISO markets are paid at the locational marginal price when such resources contribute to the supply-demand balance as a substitute for generation and when the demand response resources pass a net benefits test defined in the order.

The Market Surveillance Committee, having registered its support for the California Independent System Operator's request for rehearing of FERC Order 745,[1] now wishes to provide a fuller analysis of the core economic problems with the design of that order and with the likely results of its implementation. This analysis grows out of our continuing concern for the successful implementation of demand reduction measures, which we feel will be negatively affected by public reaction to the outcome of Order 745 if it is implemented in its present form. We also believe that this outcome will be entirely unintended, and that the Federal Energy Regulatory Commission (the Commission) would fully share our views concerning such an outcome, were it to occur.

Our first conclusion is that Order 745 assures that demand-response and supply-response will be treated differently by the power markets. Since this difference is significant and is based on no economically relevant factor, but only on the location of the service relative to the customer's meter, the effect of Order 745 will be arbitrary and capricious. This is demonstrated in Section 2 with an example that assumes that an ideal DR technology that perfectly fulfills the Commission's assumption of the equivalence of the two approaches to balancing the market. Since the intention of Order 745 is the equitable treatment of supply and demand, unless modified, the Order will fail to achieve its objective under even the most ideal circumstances.

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[1] CAISO Market Surveillance Committee, "Opinion regarding FERC Order 745, 'Demand Response Compensation in Organized Wholesale Energy Markets'", April 29, 2011.

We then highlight several additional economic problems with the rule and the benefit-cost test used to implement it. We point out that the Order 745 will pay for inefficient demand response, consumption whose economic value exceeds its cost but would be curtailed under the payment mechanism imposed by Order 745 (Section 3). In Section 4, we argue that Order 745 creates a danger that that ISOs will have to pay for potentially large amounts of phantom demand response that provide no production cost savings and have no impact on the actual market price (Section 4). In Section 5, we make three sets of criticisms of the "net benefits test" used to screen out demand response that fails to decrease consumer prices. One is that this test does not concern market efficiency, as measured by total surplus, but only the surplus for one set of market parties (load) (Section 5.1). We observe that a market objective of reducing consumer payments rather than maximizing net market surplus is a fundamental change in market philosophy that is inconsistent with open access. Our second criticism is that we find that the benefits test ordered by FERC does not correctly calculate the pecuniary benefits from using high cost demand response to depress the spot price of power (Section 5.2). Our third criticism of the net benefits test is that the rate-reduction benefits supposedly measured by this test will prove almost entirely illusory. The root of this problem is that the "benefits" measured by the net benefits test result not from actual cost savings, but by shifting the capacity revenues of inframarginal generators (including wind and solar) from suppliers to consumers. While this transfer may be possible in the short run, these capacity revenues are not economic profits, but return of and on investment. Hence, market forces will soon correct this imbalance as prices would rise to the level needed to attract investment. However, the correction will never show up in the (short run) net benefits test. The eventual market correction will prevent the "benefit" measured by the net benefits test from actually flowing to non-DR load.

2. Order 745 Treats Identical Demand- and Supply-Responses Differently and Inefficiently

In this section of the Opinion, for the sake of clarity we will analyze a simple situation considering a type of demand response that is most obviously equivalent to a supply response. For the moment, we assume away issues of measurement and verification, although we return to them later in the opinion. The analysis demonstrates that even under these conditions, the LMP payment system established by the Order treats DR and supply on a fundamentally different basis, and will result in increased market inefficiencies and higher costs for consumers.

2.1 A Simple Comparison

In order to avoid ambiguities that at times creep into theoretical discussions, we examine a concrete example of demand response. In particular, we consider dispatchable behind-the-meter generation, such as the widely publicized fuel cell-based Bloom Box.[2] In Order 745 the Commission recounts that "EPSA states that paying LMP for demand response will merely encourage load to switch to off-grid power (or behind-the-meter generation), while still being compensated." The Commission makes no objection to this example of DR, apparently accepting such behind-the-meter generation as a legitimate form of DR. Indeed it is commonplace, and preventing it

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[2] Bloom Boxes have been installed as a form of demand reduction by entities such as Google. These boxes are built from an array of four inch cubes, which might soon be usable in residential settings. So for instance, instead of turning off an air conditioner when the LMP is high, a DR provider might install a small fuel cell in a residence and turn that on while leaving the air conditioner running.

would require on-site inspections, so we believe that counting behind the meter generation as DR in this example is consistent with Order 475.

What is telling about this example is that DR is fully equivalent to supply because it actually is generation. It becomes DR only by virtue of being situated behind the meter. Moreover, because this form of DR is generation, measurement and verification can, in principle, be done perfectly, just as we have assumed, simply by metering the generators.

In Section 3, "Commission Determination," of part IV.A, under the discussion of the "Compensation Level," the Order states that:

> *"When the above-noted conditions of capability and of cost-effectiveness are met, it follows that **demand response resources** that clear in the day-ahead and real-time energy markets **should receive the LMP for services provided**, as do generation resources."* [emphasis added].

As will be seen shortly, this conclusion, that demand response resources should receive the LMP, though it agrees with several other Commission formulations of this principle, contradicts the regulatory text itself (new paragraph (g)(1)(v)). That text states that the ISOs and RTOs shall pay DR providers the LMP. This can be well beyond the value of that power to load, however, which also benefits from avoiding the purchase cost of energy.

Returning to our example of DR provided through distributed generation, one can see that load will be willing to pay up to the avoided cost of retail power for the distributed generation. When combined with the LMP payment from an ISO/RTO, DR providers will therefore receive more than LMP. The total payment could amount to twice as much or more of the LMP at times when the LMP is well below the retail price.

For example, consider prices in Pacific Gas and Electric's (PG&E) service territory (within the CAISO market). For a typical residential consumer, the marginal price of energy, G, was $139.07/MWh last month, and the first unit of energy was billed at $122.33/MWh. From this we can reasonably conclude that a DR provider who installed a small dispatchable distributed generator could charge the consumer $120/MWh for the electricity it provided. We will assume here that the DR provider retains ownership of the equipment, as is becoming more common.

While it may be objected that California's retail electricity prices are higher than those in other states with consumers served by RTOs, the Commission's justification for Order 745 is not based on specific prices, and the order does not contain an exemption for markets with prices at one level or another.

The average price of wholesale power in the CAISO was roughly $40/MWh in 2010.   Suppose that the benefit-cost test required by Order 745 would be passed by DR when LMPs are above about $45/MWh (the particular value is not important for the purposes of this example).[3] This

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[3] It can readily be shown that a simple implementation of the "benefit-cost" test would find that DR that is paid the LMP would pass that test when the LMP is higher than the level at which the supply elasticity falls below unity (assuming that the elasticity decreases for greater amounts of supply. For actual supply curves, this can occur at much lower levels. Of course, this price threshold will depend on system conditions; furthermore, actual supply curves do not show a smooth increase in slope and elasticity over output, further complicating the calculation of such a threshold price. As a final complication, as we explain later

means that under Order 745, the DR provider would receive $(120 + 45)/MWh, or $165/MWh "for services provided."

This is almost four times the LMP, that is, four times the amount that FERC states that the DR resource "should receive", if we take at face value the Order's statement that DR "should receive the LMP for services provided" (Paragraph 53). To be clear, we believe that the DR resource should receive the LMP, or $45/MWh, but not the LMP plus the avoided cost of purchasing power, which means that we consider Order 745 to be over-paying by a factor of nearly four in this case. This failure to adjust payments for DR services for avoided energy costs is one of the root problems with the Order. Indeed, as the example illustrates, there is an important difference between what the DR provider "receives" in aggregate and what it receives in the form of direct payments from an ISO.

But getting the price wrong may not be the most telling point. Consider what happens if the DR provider moves the Bloom Box cubes across the street to its own establishment and generates the sa   lectricity in front of the customers' meters. The result is, of course, that the customers will stop paying the DR provider $120/MWh since the provider is no longer saving the customer any money. Consequently, the DR provider will now receive only the LMP, which is just $45/MWh in the above example. Of course, since the fuel cell is physically so close, some or most of its power will still go to the same houses it went to before.

So nothing that matters physically has changed. As shown in Figure 1, the same physical generators are generating the same power at the same time and supplying the same houses that use it for the same purpose. But because of an arbitrary rule concerning a generator's location rela
        s meter, the supply-side generators will treated very differently by the market than demand-side generators. Table 1 shows various possibilities as the LMP varies.

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in this opinion, however, consideration of forward contracts and vertical integration change this test, generally pushing the threshold elasticity downwards.

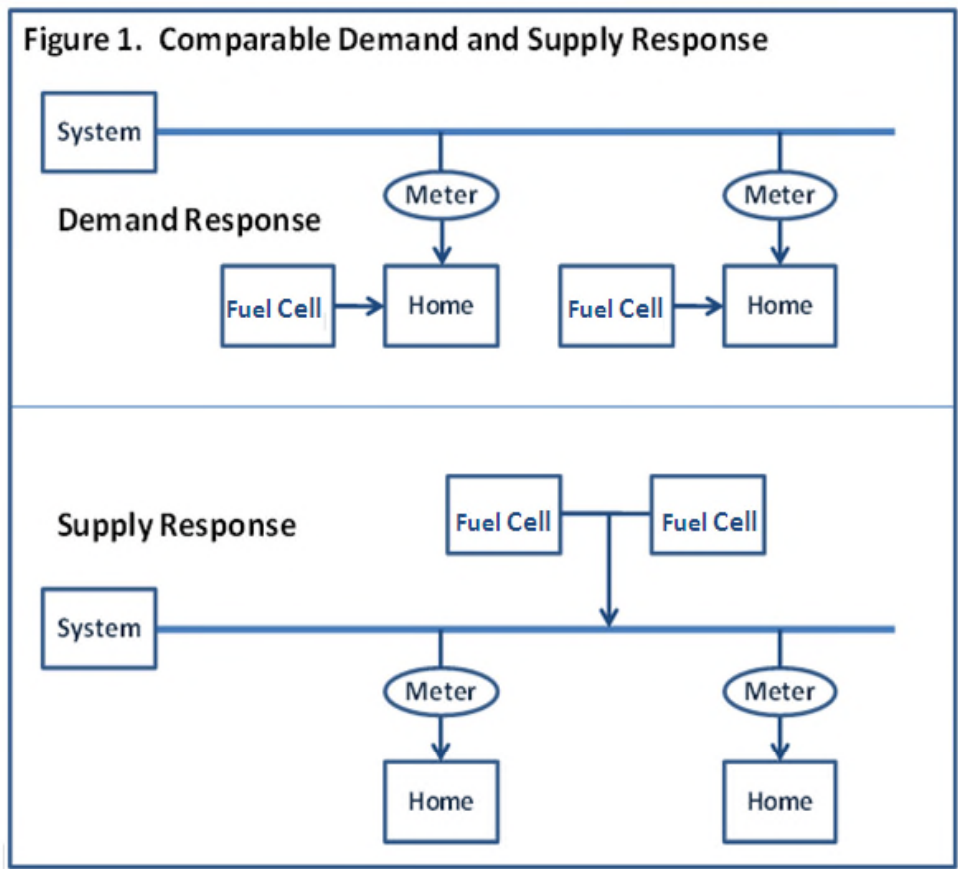Figure 1. Comparable Demand and Supply Response

Demand Response

System — Meter → Home ← Fuel Cell | Meter → Home ← Fuel Cell

Supply Response

Fuel Cell — Fuel Cell | System — Meter → Home | Meter → Home

Table 1. Payments Received by DR for Services Provided*

| LMP | Payments Received by DR | | | Payments Received by Supply |
	Payment from the ISO	Payments from Load (G)	Total DR Payment	
$30	$0	$120	$120	$30
$60	$60	$120	$180	$60
$120	$120	$120	$240	$120
$240	$240	$120	$360	$240

*Values estimated for residential DR in PG&E's service territory within the CAISO.

As can be seen, when the same technology is labeled "demand response" because it is behind the meter" it receives significantly greater payments than when it is labeled "supply response" because it is located in front of the customer's meter. This is almost the very definition of arbitrary and capricious. And, this is the outcome for the most easily verified and controllable DR,[4] which is fully equivalent to supply response. The DR payments for demand reductions provided by the

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[4] This verifiability is possible only if output of the generator was separately metered; if defined using baseline net demand, then it would be imperfect.

behind the meter generation in the example would be required under Order 745 for any ISO or RTO that administers an economic demand response program.[5]

2.2 Discussion of Reasons Offered for Paying LMP

There can be no question that Order 745 fails to yield equal treatment by the market of supply response and demand response even when they differ in name only. In fact, the outcome of the LMP requirement is unduly discriminatory. The Commission has offered various explanations for requiring that the ISOs pay LMP to demand response on top of payment it receives from load. Let us review the most important of these reasons in the light of the above examples.

- **"The Commission concludes that paying LMP can address the identified barriers to potential demand response providers" (Paragraph 58).**

  The Commission has said that it believes "paying demand response resources the LMP will compensate those resources in a manner that reflects the marginal value of the re-source." It has also said "…this Final Rule is designed to remove barriers to demand re-sponse participation in the organized wholesale energy markets." These two views are consonant if the barriers being removed are those due to underpayment of DR services. If the compensation to demand response resources is limited to the avoided retail rate, then when the retail rate is less than the LMP, (as would be the case in times of scarcity condi-tions such as reserve shortages), underpayment would be a significant barrier.

  However, that barrier occurs only when the retail rate is less than the wholesale cost of power, and correction of that barrier requires only an additional payment equal to the dif-ference between the wholesale cost of power and the retail rate. The existence of a costly barrier provides no reason to pay *more than the value* of the resource to the market. No one would suggest paying more for bread because it was inconveniently packaged or its freshness was difficult to determine.

  So the conclusion must be that intentionally designing the market so that DR providers receive as much as two or three times the value of DR (as in the above example)—or even 10 percent more—is not justified. In fact the Commission seems to agree with our a   mand re-sponse participation is not the same as giving preferential treatment to demand response providers" (Paragraph 59). This indicates that "barriers" are not a justification for the Or-der 745's payment policy, and are only a justification for making sure that demand re-sources "receive the LMP for services provided," just as the Commission concluded, no more and no less.

- **In Order No. 719, the Commission found that allowing demand response to bid into organized wholesale energy markets "expands the amount of resources available to the market, increases competition, helps reduce prices to consumers and enhances reliability" (Paragraph 61).**

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[5] The only possibility of avoiding this would be (if the Commission were to allow this) for the ISO to prohibit DR providers from providing demand reduction through such behind the meter supply technolo-gy. To be effective, such a prohibition would require on-site inspections because the source of the demand reductions cannot be detected at the meter.

While we agree that cost effective demand response can have these effects, the demand-response technology that moves across the street in our example and is re-labeled supply response would have the same effect as the demand response. Hence, in the present example, this consideration does not justify any difference in treatment between demand response and supply response; so this reason does not justify Order 745's payment policy.

- **"Requiring ISOs and RTOs to incorporate such disparate retail rates [G] into wholesale payments to wholesale demand response providers would, even though perhaps feasible, create practical difficulties for a number of parties" (Paragraph 63).**

    We agree that it could be appropriate for the Commission to allow ISO or RTO to set prices that are approximately correct when more exact pricing would be too costly relative to the benefits. However we cannot understand why the Commission would prohibit an RTO from using more accurate pricing if it and its market participants so desired.

- **"[D]emand response resources participating in the organized wholesale energy markets can be cost-effective, as determined by the net benefits test." (Paragraph 61).**

    As the context indicates, the Commission is saying that having the ISO pay the $60 LMP on top of the avoided $120 payment to purchase the power at retail (in these examples) is justified because it will be cost-effective when the net-benefit test so indicates. This will be our next topic of discussion, but in brief, the net-benefits test is a short-run test that, by definition, does not measure social benefit (increase in the sum of economic surplus gained by all market parties). Rather, it is intended to measure benefit to just one of the market parties (load), and in fact does not even correctly measure that benefit.[6] So to the extent the justification of the LMP payment depends on the results of the net benefit test, the justification must be disregarded.

3. Paying Too Much Leads to Inefficient Demand Response

The above examples illustrate the inefficiencies that result from discriminating between resources based on which side of the meter they are on. We considered the location of distributed generation in that example. These inefficiencies also result if the resource was a 'true' demand resource, in the sense of representing decreased use of energy rather than distributed generation.

In particular, Order 745 requires that ISOs pay the LMP for reduced consumption by demand response resources under conditions when reducing consumption is inefficient. The economically efficient goal should be for resources to reduce their consumption whenever the value of their consumption is lower than the cost of supplying it.

However, the incentives created by Order 745 will likely cause some demand response resources to bid their load at prices well below those prevailing during shortage conditions, even if those prices fall well short of the true value of the power to the resource. (An example is provided lat-

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[6] See discussion in Section 5.1, *infra*.

er in this section.) While it will likely be the case that the application of the "net benefits test" ordered by the Commission will at times make demand response resources submitting bids at low price levels ineligible to be dispatched off and paid the LMP for reduced consumption relative to their baseline consumption, there is no guarantee that this will always be the case.

Hence, demand response resources could submit offers to curtail load at prices just slightly above the normal level of LMPs (perhaps still below the retail rate they pay) and at times be paid the LMP for not consuming their baseline power. As was pointed out by many commenters in the proceeding,[7] this is inefficient. The net benefit to the consumer of consuming power at the retail rate equals the gross value minus the retail cost of the power. The social net benefit is the gross value minus the marginal cost of power. However, the net benefit to a load that provides DR under the Order's LMP payment rule would be much less than either of these values, equaling the consumer's *net benefit* of consumption (the gross value of power consumption less the avoided retail cost of the power) *minus* the LMP (which it would be paid as a DR response). Consequently, there is an over-incentive to reduce power consumption.

Consider a factory whose value of power is 20¢/kwh and pays a retail rate of 11¢/kwh. The consumer's *net* benefit of consumption after paying the retail price is 9¢/kwh. Efficient use of power would trigger reductions when prices rose above 20 ¢/kwh, but encourage consumption when prices were below this. By paying this facility the LMP without any adjustment for the retail price, this factory would find it profitable to provide demand response whenever the LMP rising above its net benefit of 9¢/kwh. Yet curtailing demand when LMPs are, say 12¢/kwh, would actually *destroy* 8¢/kwh of economic value to the market (the difference between gross value of consumption and marginal cost).

While the Commission alluded to various potential barriers to providing the efficient level of demand response such as "lack of a direct connection between wholesale and retail prices, lack of dynamic retail prices (retail prices that vary with changes in marginal wholesale costs), the lack of real-time information sharing, and the lack of market incentives to invest in enabling technologies that would allow electric consumers and aggregators of retail customers to see and respond to changes in marginal cost of providing electric service as those costs change,"[8] none of these conditions are relevant when the LMP is below or modestly above the normal range of LMPs and the retail rate. Yet the Commission's order would require that ISOs pay demand response resources the LMP for reducing their consumption in these circumstances, unless the DR fails the Commission's "net benefits test", which we discuss later in this Opinion.

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[7]See, for example, Comment of the Federal Trade Commission, May 13, 2010 pp. 6-10, Comment of the Federal Trade Commission October 13, 2010 pp. 3-5; Comments of the ISO New England Inc Internal Market Monitor, May 13, 2010, pp. 7-9; Comments of the Independent Market Monitor for PJM, May 13, 2010 p. 7; and Comments of Potomac Economics Ltd, May 13, 2010 pp.6-7.

[8]Paragraph 57

4. Phantom Demand Response

In the example in Section 2 in which we discussed the impact of where a resource resides relative to the meter, we assumed that the DR was provided by distributed generation whose output could be readily and accurately verified. For DR in the form of demand reductions rather than distributed generation, the overpayment can result in additional and very substantial market distortions because of the incentives it provides for "phantom" DR through, for example, inflated baselines. In this section, we describe why we believe that the FERC order creates the potential for a substantial amount of "phantom" demand response – payments for fictitious reductions in demand that did not exist in the first place. Such phantom DR would impose costs on consumers without providing any offsetting benefits.

DR is to be paid LMP if it passes the separate benefit-cost test and complies with ISO metering and verification requirements. The key difficulty with this requirement that leads to a danger of a substantial increase in phantom DR is that it is inherently impossible to measure power that would have been consumed but was not with the same accuracy as actual generation or consumption. Payments for power that was not consumed must in practice be measured by comparing actual consumption to some baseline measurement of expected consumption. Participants in price responsive load programs have the ability to submit bids that cause their demand to be "dispatched" whenever they know that their actual consumption will fall below their baseline for any reason, including holidays, reduced demand for their product, changes in the production cycle, etc. There are substantial real-world difficulties associated with defining baselines, ensuring that they are not inflated, and verifying the performance of demand resource. The CAISO Market Surveillance Committee has previously adopted Opinions that documented these problems, including evidence of inflated baselines resulting from overly large payments to DR.[9]

ISOs have until now limited the costs imposed on consumers by such phantom demand response through minimum bid price rules, LMP-G payment rules,[10] or limiting DR payments to emergency conditions only.[11] However, we are concerned that the first two protections against phan-

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[9] F.A. Wolak, J. Bushnell, and B.F. Hobbs, "The California ISO's Proxy Demand Resource (PDR) Proposal," Opinion of the Market Surveillance Committee of the California Independent System Operator, May 1, 2009a, www.caiso.com/239f/239fc54917610.pdf; F.A. Wolak, J. Bushnell, and B.F. Hobbs, "Comments on Barriers to Demand Response and the Symmetric Treatment of Supply and Demand Resources," Opinion of the Market Surveillance Committee of the California Independent System Operator, June 30, 2009b, http://www.caiso.com/23e7/23e793a012800.pdf .

[10] Rules that pay the demand response resource the difference between the locational marginal price at its node or zone and some measure of the retail rate or base line cost of power.

[11] These rules have been imposed precisely because of past problems with phantom demand response,. For example, the New York ISO established a $50 minimum bid level for its price responsive load program (Day-Ahead Demand Response Program) in 2003 and raised it to $75 in 2004 for precisely this reason, see the Commission's Order in Docket ER03-303-000, 102 FERC para 61,313, March 21, 2003, and its letter order in Docket ER04-1188-000 October 29, 2004. Neenan Associates, NYISO Price-Responsive Load Program Evaluation Report, January 8, 2002, noted with respect to the price responsive load program that "A significant portion of the accepted bids came in the early morning or late evening hours, and as would have to be the case, they were bid in at very low prices." P. 1-49, see also Table 1.2D pp. 1-122-1-127; New York ISO, "Proposed Changes to Day Ahead Demand Response Program," Business Issues Committee, May 19, 2004; PJM uses a demand response payment mechanism that adjusts

tom DR will be eliminated under the Commission's Order unless the "net benefits test" ordered by the Commission allows minimum bid prices to be set at a sufficiently high level or allows other rules such as LMP-G pricing to be applied.[12] The Commission's order precludes minimum bid prices set at a level higher than that defined by the FERC benefit-cost test (in effect, where supply elasticity exceeds 1), as well as precluding LMP-G pricing for demand response. The only limitation under Order 745 on the obligation to pay the LMP to demand response resources for demand reductions, even those with bids below the normal range of LMPs and the retail rate, is the "net benefits test" and the requirements for measurement and verification.[13]

If the Commission's order precludes minimum bid requirements in excess of the net-benefits threshold price (or worse precludes them entirely), this would allow demand response resources to bid as to require that ISOs pay the LMP for every reduction in consumption below the baseline, even when this reduction is coincidental and stems from the normal variations in consumption that cannot be accounted for in the baseline. This kind of phantom demand response may not lead to huge payments to individual resources, but can in aggregate entail large payments by consumers without any offsetting benefit.

Unfortunately, this lack of benefit is not accounted for in the "net benefit test" ordered by the Commission. While it is likely that the "net benefits test" ordered by the Commission would operate to relieve the California ISO of the obligation to make payments to providers of phantom demand response in some hours, this would not be because the demand reductions are phantom, but only if it were found that the real-demand response would not satisfy the benefits test. Hence, it appears that there would still be many hours in which California ISO and its consumers would have to pay for fictional demand response under the Commission's order. This would be a substantial and unwarranted burden on California power consumers. While it may be case that the "net benefits test" will be implemented in way that implies that DR bid in at LMPs that are below the retail rate will never qualify for payments under the Order, this is not assured by the order but depends on the result of the elasticity calculation embodied in the net benefits test.

The elimination of any threshold price except that implied by the net benefits test has the potential to undermine the validity of the baselines used to measure demand response. This is because

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for the price of power ("LMP-G") to address the potential for phantom demand response, see Monitoring Analytics, 2010 State of the Market Report for PJM, pp. 139-145.

[12]There are several statements in the order that we interpret as providing that the ability of a resource to provide demand response and the benefits test are the only explicit limitations on the requirement that ISOs pay the LMP for baseline power that is not consumed. For instance, in Paragraph 48 it is stated: "we find, based on the record here, that, when a demand response resource has the capability to balance supply and demand as an alternative to a generation resource, and when dispatching and paying LMP to that demand response resource is shown to be cost-effective as determined by the net benefits test described herein, payment by an RTO or ISO of compensation other than the LMP is unjust and unreasonable. When these conditions are met, we find that payment of LMP to these resources will result in just and reasonable rates for ratepayers." Paragraphs 54 and 82 make similar points.

[13]Paragraphs 48 and 54, cited *infra.*, appear to us to call for paying the LMP to demand response resources that reduce consumption during normal system conditions, if the "net benefits test" is satisfied. If our understanding is mistaken, and the Commission intends to restrict the application of the payments to demand response resources under Order 745 to shortage conditions, i.e., hours of reserve shortage, then it is critical that the Commission clarify in a rehearing order that this is the intent of the Order.

could come to be based disproportionately or perhaps largely on the days with the highest level of load, with other days excluded as "event days," further magnifying payments for phantom demand reduction.[14]

For example, suppose that the baseline were based on the average load during the same hour of the last ten non-event days, and a demand response provider had an initial baseline of 5 MW. Then suppose it had ten days with loads absent any curtailment of 2, 3, 4, 4, 5, 5, 6, 6, 7 and 8 MW, respectively, an average of 5 MW. Absent minimum bid prices, the demand response resource would offer 3 MW of price responsive load at a low price on the day on which it had 2 megawatts of load, offer 2 MW of price responsive load on the day on which it had 3 MW of load, and offer 1 MW of demand response on the days on which it had 4 MW of load. Over these days the provider would be paid for 7 MW of phantom demand response arising from the normal variations of its power consumption relative to the baseline. Moreover, the low load days would now be event days and excluded from the baseline, so the average load in the non-event days would rise to 6.16 MW, making it possible for the demand response provider to in the future offer 1 megawatt of demand response on the days on which it only had load of 5 MW. In addition, it would be paid for an extra MW of phantom demand response on the days on which its actual load was 2, 3 or 4 megawatts. This erosion of the baseline would continue, as the market participant would be able to offer 1.16 megawatts of price responsive load on days on which it had only 5 MW of load, and these days would be treated as event days in subsequent baseline calculations; as a result, the average non-event load would then be pulled up to 6.75 MW.[15]

It is possible that ISOs might be able to craft baseline rules that limit the payments to phantom demand response or that the net benefits test will often operate to avoid the need for such payments, but this will not necessarily be the case. This ambiguity means that the Order opens the door to requiring consumers to pay for phantom demand response, so ISOs should be allowed to

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[14] In the extreme case, if the FERC order were applied in a manner that prohibited all minimum bid requirements, even minimum bids set at a level lower than the floor price for payment defined by the net benefits test, this would allow demand response providers to submit bids so low that there would be no non-event days and would create the potential for enterprising demand response providers to identify industrial facilities capable of consuming large amounts of power, but which are uneconomic to operate at real-world power prices. These resources could be bid in to ISO markets as demand response resources at bid prices so low they are always, or nearly always, dispatched off by the ISO during the day, so that they could maintain an inflated baseline based on operations scheduled specifically to establish the baseline.

While the Commission stated that "demand reductions that are not genuine may be violations of the Commission's anti-manipulation rules," (paragraph 95) it appears that a phantom demand response resource, of the type described above, would not violate the Commission's anti-manipulation rules if the resource could demonstrate its ability to consume the power in the event the price of power were lower than its bid.

[15] The higher the minimum bid price threshold allowed by the net benefits test, the less the attenuation of the baseline. For example if price on the 2 megawatt day were below the price threshold established by the net benefits test and a minimum bid requirement set at that level prevented the market participant from offering price responsive load in that hour, that hour would not be excluded as an event hour, so the baseline would initially raise only to 5.57 megawatts rather than 6.16 megawatts.

establish some form of minimum bid price for demand response independent of the "net benefit test."

5. Net Benefits Test

In emphasizing the ability of demand- and supply-side resources to substitute for each other, and the need to ensure they are paid the same, the Order makes clear that the Commission's central goal is improvement of market efficiency by ensuring that consumer demand is met at least societal cost.[16] We agree that market efficiency should be the guiding principle of market design (although we argue in the previous section that in fact, paying LMP to DR will frustrate that goal and discriminate in favor of resources on the demand-side of the meter).

However, the Order contradicts itself when it mandates a separate test for one class of resources that is based on a different goal entirely. The "net benefits" test of cost-effectiveness that the Order imposes is not concerned with market efficiency as it does not attempt to consider the societal cost of meeting demand (equivalent to considering benefits to all market parties), but instead focuses on just pecuniary benefits to consumers. We believe that the "net benefits test" proposed by the Commission is deeply flawed both theoretically, because it singles out short-term pecuniary benefits to one market party or set of market parties, and practically because it does not ensure even its stated goal.

The stated objective of the benefits test of reducing payments by consumers[17] is inappropriate, and this test does not even correctly measure net consumer payments. Such a test is required of DR and no other resource. We believe that the Commission's instituting a net benefits test beyond the market test of bidding and being accepted in an auction indicates that the Commission is aware that paying LMP to DR is not necessarily efficient, and does discriminate inefficiently, at least at some times, in favor of demand response.

No such test would be necessary if instead a payment of LMP-G was made to fully verified DR. Genuine DR that can be profitable under this payment is efficient (increases market surplus) while any DR that cannot make money under that price reduces market surplus. With the correct payment, no separate screen, such as the Order's benefit-cost test, is needed.

Below, we first explain why we believe that the implied objective of the benefits test is inappropriate and inconsistent with market efficiency. Then we discuss reasons why the test, as proposed, incorrectly calculates the short-term pecuniary benefits to ratepayers. Finally, we explain why in the long run the expenditure of resources on inefficiently expensive DR will not be successful in lowering prices.

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[16] This is implied by the Order's emphasis on paying resources that that can substitute for each other the same price.

[17] Footnote 162, Paragraph 80.

5.1 Inappropriateness of Consideration of Pecuniary Benefits

The essence of the "net benefits test" that FERC imposes in Order 745 is the net billing effect,[18] which measures the pecuniary impact of demand reductions in reducing total payments by consumers for power by depressing the spot price of power.[19] As just pointed out, this judges cost-effectiveness from the point of view of pecuniary benefits to one group of market parties, not the total cost of meeting consumer demand. This test is related to the criterion for the profitable exercise of monopsony power, rather than measuring reductions in the resource cost of meeting consumer load. This is a large and important departure from the FERC market design principle, which is nondiscriminatory market access to promote maximum market efficiency, as measured by the usual market efficiency metric of producer plus consumer surplus (plus any transmission congestion surplus). This departure violates the fundamental market principle of 'the law of equal marginal costs' in which two resources meeting the same need receive the same revenue or benefit; this law is enforced by market rules that maximize net market surplus, not the benefits to one particular set of market parties.

As we pointed out above, the Order recognizes that market efficiency is the primary objective of market design. However, the benefits test is inconsistent with that objective. We question whether it is good public policy to incur costs that will be recovered from consumers in order to discriminate against resources in the manner we have documented in Section 2 and depress spot energy market prices. We think this policy is unlikely to benefit consumers, for reasons we explain in the next two subsections.

This last point is the one we think is particularly important to keep in mind. In the end the costs of all the market inefficiencies incurred in order to implement elaborate schemes to depress spot prices will be borne by consumers. Meanwhile the "benefits" of depressed spot prices that are not the result of production costs savings are likely to be brief or completely illusory. Hence, we think that the policy that benefits consumers is to make the market as efficient as possible, and Order 745 as it appears to be structured is a major step in the wrong direction.

5.2 Incorrect Characterization of Short-Run Pecuniary Effects

However even if one thought the criterion of reducing payments by load, rather than minimizing the social cost of reliably meeting load,[20] was desirable, and even if the demand reduction were real, the benefit-cost test appears likely to grossly overstate the actual pecuniary benefits to consumers from demand response.

From the standpoint of measuring the pecuniary benefits to consumers, the FERC benefits test is accurate only for a power buyer with no forward hedges (i.e., a buyer that is not hedged either through generation ownership, contracts or financial rights ownership). In particular, we note

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[18]See, for example, paragraphs 78, 79, and 80

[19]Total payments calculated based on the spot price of power which as noted above does not measure the actual cost of purchased power in the case of load serving entities that own generation, have purchased or been allocated congestion hedges, or have contracted forward for power.

[20] With social cost defined using the usual metric of market efficiency (the change in the sum of market participant surpluses, including consumer surplus, transmission congestion rent, and producer surplus).

that a reduction in the spot price of power does not, even in the short run, benefit the following customers:

- customers of investor owned utilities meeting customer load with their own generation;[21]

- customers of municipal utilities or cooperatives meeting customer load with their own generation;

- customers served under multi-year power contracts, including Provider Of Last Resort contracts, qualifying facility contracts and renewable generation contracts;

- customers for purchases hedged through ownership of congestion rights, CRRs in California, FTRs or TCCs in other ISO markets, when prices are reduced only in constrained areas.

Thus, the FERC "net benefits test" does not correctly measure even the pecuniary benefits to consumers from depressing the spot price of power by replacing low cost generation with higher cost demand response which the order apparently seeks. One reason that this is the case is that the test described in the Order does not take account the extent to which consumers have contracted forward for power supply through either ownership of generation or financial or physical contracts for power.[22] It does not benefit a consumer of a municipal utility that uses its generation to meet its customers load to incur additional costs to suppress the spot energy price; that is just a dead weight loss to the consumers of such a utility.[23]

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[21] The incremental cost to consumers of this power is the cost of the generation fuel, variable operations and maintenance costs, and any emission allowance or tax costs that vary with output. Reductions in the the spot price of power do not reduce this cost of the power generated by such utilities to meet customer load.

[22] If forward contracts are correctly accounted for, the benefit-cost test's implicit criterion of less than unit elasticity for the supply curve actually becomes a much lower value of elasticity. This would significantly raise the implicit price threshold at which DR would pass the test, and would make it significantly more difficult for DR to pass the test. See B.F. Hobbs, "FERC Order 745 Benefit-Cost Test: Two Simple Analy www.caiso.com/2b6f/2b6f81672f7c0.pdf . For instance, if the forward price is 20% higher than the LMP, and forward contracts amount to 70% of the load, then the threshold elasticity is 0.26, not 1.0. At higher elasticities, paying LMP to DR would increase prices to consumers. Unfortunately, careful application of this test would require estimates of both the amount of forward contracts and their prices, information which is not readily available.

[23] The "net benefits test" also appears premised on the absence of congestion across the ISO footprint. Footnote 162 of the Order states the test as follows: "(t)hus the test is to determine where: (Delta LMP x MWh consumed) > LMP new x DR." Not only is this test not correct if the "MWh consumed" is for the footprint as a whole but the price impact is more local. The test is not correct even if the Delta LMP is calculated for the same region as the MWh consumed, because this would fail to account for congestion rents. If the Commission wished to measure the pecuniary benefits to consumers of reducing the spot market price, the correct measure would be the Delta LMP x the MWH of *generation* within the constrained region. Since the load would exceed the generation within a transmission constrained load pocket, perhaps by a lot, the "net benefits test" stated by the commission would overstate the pecuniary benefits to consumers of paying less for energy.

Finally, the way Order 745 discusses short run supply curves and pecuniary benefits grossly understates the complexity of implementing such a principle in LMP-based electricity markets. It also appears to order an approach to calculating the elasticity of supply that would likely materially understate it. Understating the elasticity of supply would further overstate the pecuniary benefits from demand reduction. In ISO and RTO market designs, the "real-time supply curve", i.e., the real-time bid stack for the five minute dispatch, depends on the unit commitment decisions in the day-ahead market, and then in an intra-day evaluation process (HASP/RTPD in California) in which additional unit commitment and import/export scheduling decisions are made. Any benefit analysis that takes the unit commitment/import scheduling decisions as fixed will likely calculate a "supply curve" that is much less elastic than the true supply curve.[24] Moreover, in California, the real-time dispatch minimizes the production cost of meeting load not only in the current dispatch interval, but optimizes over time, adding further complexity to any effort to implement the benefit calculations ordered by the Commission. Indeed, depending on exactly how the Commission intends the benefit calculation to impact the real-time dispatch,[25] the effort to implement the benefit calculation would be so complex that it would require delaying implementation of other software changes needed to accommodate higher levels of intermittent generation on the California ISO grid.[26]

5.3 Long Run Ineffectiveness of Inefficient Expenditures to Depress Prices

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[24] It should also be kept in mind that for consumers to reap the pecuniary benefits from real-time spot price suppression, that suppression needs to be reflected in day-ahead market prices. If the load serving entity that serves those customers is not aware of, and cannot predict, the trigger price or amount of real-time demand response and buys power in the day-ahead market, it will not be purchasing power at artificially low real-time prices. Instead, it will be selling back power at artificially low real-time prices, benefiting generators, not consumers. If the real-time demand reductions are predictable day-ahead, load serving entities would reflect the expected reductions in the amount of power they buy day-ahead, leading to lower real-time prices. If load serving entities are sometimes right in expecting and getting demand response but sometimes wrong in expecting but not getting demand response or not expecting but getting demand response, it becomes difficult to assess what portion of the potential pecuniary benefits from spot price suppression would actually flow to load serving entities and their customers. Our reading of the order does not suggest to us that the Commission has imposed any requirements that demand response resources provide any such advance information in order to qualify for such payments.

[25] If it is intended that the benefit calculation would only affect whether demand response resources were paid the full LMP when dispatched, but they would be dispatched based on their bid without regard to the benefit calculation, this could be implemented with an after the fact benefit calculation to determine compensation and would not unduly complicate the real-time dispatch (although it could lead to reliability impacts if uncertain payment impacted the response of demand response resources to dispatch instructions. If it is intended that demand response resources would only be dispatched based on their bid if the dispatch satisfied the benefits test, this would be so complex to even to attempt to implement with the current dispatch software that it would certainly greatly complicate and perhaps even preclude prospective improvements in real-time dispatch software intended to reduce the production cost of meeting load and improve reliability.

[26] See, for example, California ISO, Discussion Paper, "Renewable Integration: Market and Product Review," July 2010 p. 16; California ISO, "Renewable Integration & Product Review-Phase 2," April 12, 2011 pp.17-19; California ISO, "Discussion & Scoping Paper on Renewable Integration Phase 2," April 5, 2011 pp. 12-15.

In the long run, the impact of demand response on spot prices will be reflected in the forward price of power and capacity. However, because the long-run supply curve is much more elastic at the margin than the short-run dispatch curve, the impact of demand response on forward prices will be much less than estimated by the "net benefits test." In the long run, the sum of contract payments and energy payments must cover the cost of new generation and going-forward costs of old generation. As a result, the effect of paying more than LMP to behind-the-meter-resources (as demonstrated in Section 2) is to inflate costs in a vain attempt to suppress spot energy prices, because this will just raise the contract and capacity market payments consumers must make to keep existing and needed generation available.[27]

The Commission gave short shrift to capacity markets in the Order, saying "This Final Rule is focused only on organized wholesale energy markets, not capacity markets. … Indeed, in some cases, the capacity markets already reflect energy and ancillary service revenue in determining capacity prices." We appreciate the Commission's inclination to disentangle this complex issue from the even more complex and equally contentious issues of capacity markets. And on this point we will follow the Commission's lead in that we will not discuss the formal structure of capacity markets or capacity payments.

Bu   lf when it said "in some cases, the capacity markets already reflect energy and ancillary service revenue …" What needs attention is the capacity revenue that already comes from the energy market, and not just in some cases but in every case. That capacity revenue is the source of the supposed "benefit" of reducing the LMP, and failing to examine the source of this benefit, in even a cursory manner, means the Commission's central justification for paying LMP[28] is unsupported, and as it turns out, unsupportable.
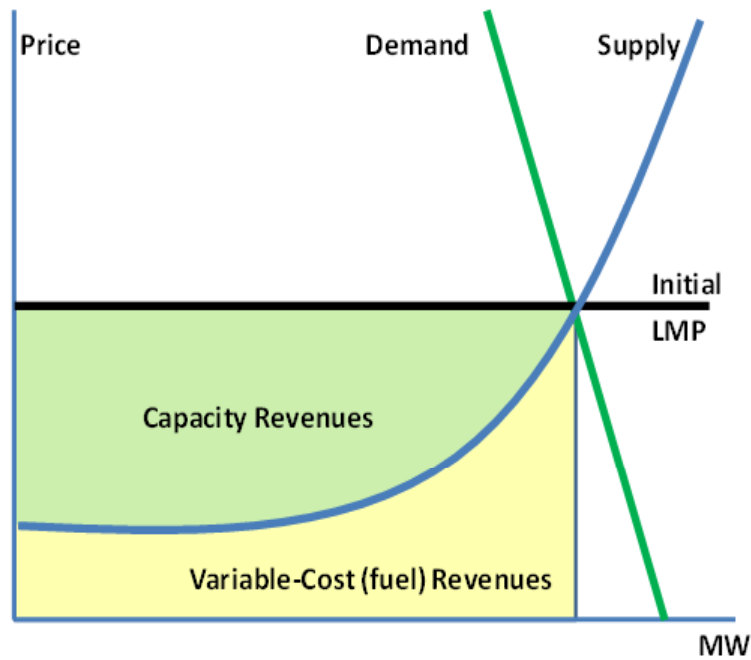
5.3.1 Where the Benefits Come From. Figure 2 shows short-run supply and demand curves for a particular hour in a RTO market. As Figure 2 shows, variable costs, which are mainly fuel costs, are given by the yellow area below the short-run supply curve, which is also known as the short-run marginal-cost curve. All of the area below the LMP and to the left of the market-clearing quantity (yellow and green combined) is revenue that flows to generators. (We disregard the existence of forward contracts and other complications for purposes of this discussion.) As can be seen, much of this revenue—the green area—is not needed to cover variable costs. The green area, rather is the revenue above operating costs, sometimes called the ``capacity rent'' earned by generators. If the supply curve represents the true incremental costs of production (e.g. there is

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[27] The Commission notes at paragraph 85 that "indeed in some cases, the capacity markets already reflect energy and ancillary services revenue in determining capacity prices." However, the Commission needs to be mindful of the fact that that a reduction in energy market margins will necessarily raise the capacity payment in the long run if adequate generation investment is to be maintained. Hence if Order 745 had the intended effect of reducing energy spot prices, it would, other things equal, result in an increase in the capacity prices paid by unhedged consumers. Thus the order would boil down to consumers paying less out of one pocket to generators, and more out the other pocket to generators, while also having to pay for the inefficient demand response.

[28] "[D]emand response resources participating in the organized wholesale energy markets can be cost-effective, as determined by the net benefits test" (Paragraph 61), which was the first reason given by the Order for paying LMP to demand response.

no market power) these revenues are largely, and in many cases entirely, needed to cover capacity costs, i.e., the return of and on the investment in generating capacity.

Figure 2. Capacity Revenues and Variable-Cost Revenues

Now assume that the LMP shown in Figures 2 and 3 is somewhat above the threshold implied by the net-benefit test of Order 745 (i.e., where supply elasticity falls below 1). Also assume that a DR program takes place that passes the net-benefits test and shifts the demand curve to the left as shown in Figure 3.

Figure 3. Load's DR Benefit Comes from Capacity Revenues (Gross Margin)
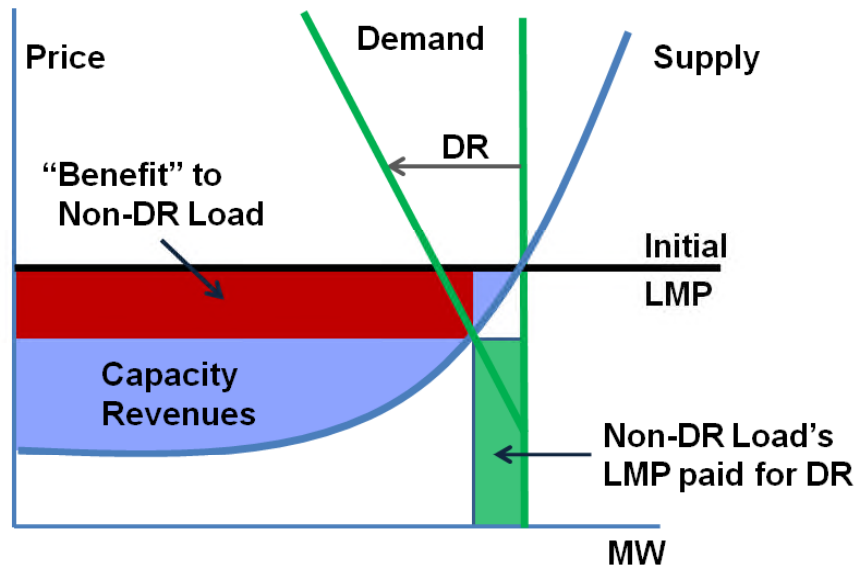

Figure 3 shows the pecuniary benefit that load will derive from the reduction in the LMP caused by the demand response. As can be seen it is greater than the cost to load of the DR program (which is the new LMP times the amount of load reduction), so the net-benefits test would be passed. This is true for any region of the supply curve that is inelastic.

But this benefit to load is entirely derived from by reducing generator gross margin that the Commission has repeatedly agreed is needed—and indeed insufficient—to cover capacity costs. Moreover, the DR response shown, which causes this transfer, has no effect on the costs of these generators. The completely standard DR program shown in Figure 3 takes revenues from suppliers, revenues which the Commission has frequently agreed the generators need to cover their capacity costs, and has given these revenues to non-DR load. This is the benefit to load measured by the net benefits test.

Technically, a market design that has all load pay a price greater than the market price[29] to subsidize demand response in order to depress market prices has an effect analogous to the exercise of monopsony power—market power exercised by customers—but it is clear from the Order that it was not intended as such. Instead the Order's hope has been that this benefit to load resulted from a genuine cost savings. In fact, the point of economic efficiency is to reduce *costs* and thereby lower the *cost* to load. Unfortunately the two, completely distinct meanings of "cost" in this statement frequently cause confusion. The costs that are reduced by efficiency gains are capital and short run production costs. Under competition, these will generally lead to reduced purchasing costs for load. However, reductions in the cost of purchasing power can arise from sources other than a reduction in the cost of production—for example a large buyer could pay an expen-

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[29] I.e., pay LMP+G which is greater than LMP; as Section 2 shows, this is what non-DR load would be paying demand response under the Order's LMP pricing rule.

sive generator to produce power out of merit in order to depress the energy price the buyer would pay to other generators. The latter would be a classic case of monopsony power.

There may be efficiency gains (that reduce the cost of production) if DR programs reduce peak load, and there could be other efficiency gains if DR programs are sufficiently inexpensive. Indeed, we believe that the potential benefits of efficient DR are likely to be large, and the MSC has said so in several previous Opinions.[30] However, efficiency gains in the form of reduced costs of meeting load are not the only reason that DR can reduce prices; inefficiently expensive DR can also reduce consumer expenditures by transferring income from producers to consumers, in a manner similar to the exercise of monopsony power. By not checking any other possibility, the Commission has implicitly assumed that the price reduction measured by the net benefits test is entirely the result of efficiency gains. This assumption is not only unwarranted, but as Figure 3 shows, at times clearly mistaken. In that wholly typical case, the price reduction does not result from a reduction in the cost of meeting load that enables lower value power demand to be met, bu   lts from reducing high value power demand, and any "benefit" to consumers is only a wealth transfer.

The net-benefits test is not based on reducing the social cost of meeting load resulting from efficient DR programs. This conclusion in no way negates the view that DR programs can increase efficiency, as well they can. But that benefit cannot be seen in the short-run impact on prices, especially when DR programs are receiving more than LMP in return for their services.

5.3.2 Why the Benefits Will Not Last. Furthermore, although Figure 3 shows a transfer from suppliers to load, this transfer is likely unsustainable. Such transfers will leave incremental generation with a sub-normal return on equity, which means either that (1) supply will exit or new supply will fail to enter, leading to a leftward shift in the supply curve compared to where it would have been otherwise or (2) the market will correct the problem by raising prices to a level sufficient to incent investment, putting an end to the transfers. There is no other outcome. Investment in new supply will cease until the market returns to generation again to cover capacity costs. We now consider each of these two scenarios.

First, DR programs could be so strong that they permanently prevent the need for new capacity, while the old capacity slowly retires, with the end result that all generation takes place behind the meter under the guise of demand response. In this case DR programs could siphon off the capacity revenues of existing generation. This would speed the rate of retirement somewhat, and result in loss of value for all existing generators. If this were to occur simply because the Commission has allowed a more-efficient type of competitor into the market, then this outcome would be efficient and could not be criticized. But if this outcome occurs because DR providers are receiving LMP+G, while old-fashion supply is receiving only LMP, the loss of value would be a regulatory taking.[31]

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[30]Wolak et al., 2009a,b, *op. cit.*

[31] In that case, the costs of DR are likely to increase over time in order to permanently avoid the need for new generation. For instance, say in period 1 we pay $100,000 for DR that reduces the price from $50 to $48, and reduces payments to generators by $150,000. Then in period 2, unless that payment to DR is made again, price would not only rise back to $50 without DR, it would rise above $50 because there is less generation. Now the market needs to buy even more DR to keep the price at $48, and might have to spend $100,000 for DR just to keep the price at $50.

However, the second possible scenario is more likely. In this scenario, DR programs will not be strong enough to keep ahead of both load growth and generation retirement. As a consequence, some (though less) new investment will remain necessary. But the market will refuse to invest at all until normal capacity revenues are restored. But to restore normal capacity revenues from the energy market, it will be necessary to put an end to the flow of capacity revenues into the pockets of load.[32] And investors must be convinced that this has been stopped permanently. Most likely, the market will handle all this in its normal way. There will be a slight shortage of capacity, and spot prices will, on average, go back up by the amount they were reduced by the DR programs.

So the likely outcome is that the benefit transfer to load will end sooner or later by raising prices and without any disruption. Fortunately, markets are quite robust. The result will be that the short-run net-benefits test of Order 745 will continue to assure load that it is successfully picking the pockets of generators, but this will be an illusion. In reality non-DR load will be paying for the subsidized costs of DR programs. Because of the inefficiencies in this arrangement, rates will rise, and eventually non-DR load will discover that it is their pockets that are being picked and not those of the generators.

6. Conclusion

We have demonstrated that the effect of FERC Order 745 will be to discriminate in favor of demand response by instituting a market design that will pay it well in excess of LMP, especially during periods of moderate and low prices. This discrimination is arbitrary, based on the location of resources on one side or the other of the customer's meter. The result is likely to be inefficient deployment of DR, including distributed generation, and the risk of increased phantom DR. The net benefits test is not a test of market benefits, but of pecuniary benefits to one set of market parties, which we believe is an inappropriate philosophy for a market test. The net benefits test also fails to correctly represent short run pecuniary benefits, and in the long run, most of those benefits will be illusory because capacity or energy prices would need to in compensation rise to ensure sufficient return to generation investment. Consequently, paying more than LMP to inefficient DR resources will ultimately result in increased costs to consumers, not decreased costs.

The implicit subsidization of wholesale DR through the LMP payment mandate will also increase obstacles to retail demand response, especially real-time pricing. This is because such retail programs will be at a financial disadvantage, as participants would only have an demand reduction incentive equal to the real-time price, as opposed to the LMP+G incentive implicit in Order 745. As a result, Order 745 will have the effect of encouraging DR in the bulk power market at the expense of retail programs; in the long-run, this may mean less involvement of demand in the market, not more, and certainly will result in more problems with verification and monitoring.

Because of these fundamental economic issues with Order 745, we urge FERC to revisit several aspects of its DR policies. Most importantly, FERC needs to allow ISOs that are implementing

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[32] Alternatively, and equivalently, a new capacity charge could be levied on load.

DR programs to set payments such that DR providers and consumers together receive *total* benefits that approximate LMP, rather than receiving a payment equal to LMP from an ISO in addition to avoiding payments for the energy that is not consumed. Many of the other incentive problems we highlight in this opinion stem from these excess revenues that could flow to DR providers when a full LMP payment from ISOs is required for demand reductions. A past MSC opinion has argued for a mechanism such as "buying a baseline" to accomplish this,[33] but certainly setting payments according to LMP-G principles is a step in the right direction. If the LMP-G payment approach is adopted, then as a second step we would advise eliminating the net benefits test. If the excess payments are minimized, then there is little need for an additional net benefits test. Finally, we believe that ISOs must be allowed reasonable discretion to develop rules and protocols to help minimize the potential economic harm to the market from phantom demand response.

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[33] Wolak et al., 2009a, *op. cit.*

Exhibit B

Concurring opinion on Economic Issues Raised by FERC Order 745,
"Demand Response Compensation in Organized Wholesale Energy Markets"

by

Steven Stoft, Member
Market Surveillance Committee of the California ISO

June 6, 2011

For reasons explained in this opinion and for others stated in the Market Surveillance Committee's "Opinion on Economic Issues Raised by FERC Order 745," I agree that Order 745[1] will result in treatment of supply and demand resources that is arbitrary and capricious as well as unduly discriminatory. I further agree that the Order will not provide the benefits supposedly measured by its net benefits test and will instead likely decrease the net benefits to consumers, resulting in rates that are neither just nor reasonable.

Perhaps most importantly, I agree that Order 745 will ultimately prove a setback for the demand response programs that the Federal Regulatory Energy Commission (the Commission) and the Market Surveillance Committee seek to enhance. I write separately to provide an analysis that makes transparent the fundamental flaw on which Order 745 is premised and the consequences of that flaw. It is my hope that this will lead to a sounder basis for compensating demand response and consequently to more successful and durable demand-response programs.

1. The Double-Payment Conundrum of Order 745

Order 745 argues forcefully that the wholesale price (LMP) "represents the marginal value of … a reduction in consumption."[2] The Commission then concludes that demand response (DR) "should receive the LMP for services provided."[3] However, the Commission rejected the option of implementing this prescription. In its place it chose a policy of paying LMP *in addition* to the compensation received by DR providers in the retail market. Retail compensation takes place at the retail-tariff energy rate, G, so the total compensation received by select DR under Order 745 is LMP + G. In essence such DR is paid the wholesale price plus the retail price. This is termed "double payment."

This opinion will investigate the Commission's justification for choosing double payment and the consequences of that choice. It is commonly believed that the Commission's justification rests on the "Jurisdictional View"—the view that since the Commission has no jurisdiction over retail rates, it cannot take them into account and so must pretend that G does not exist. Of course, it makes little sense to argue that the Commission must base its policies on an assumption that things it does not have

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[1] Demand Response Compensation in Organized Wholesale Energy Markets, Order No. 745, 134 FERC ¶ 61,187, 76 Fed. Reg. 16658 (2011) ("Order" or "Order 745"). Previously in this proceeding, the Commission also issued a Notice of Proposed Rulemaking ("NOPR") on March 18, 2010.
[2] Order 745 at P 53.
[3] *Id.*

jurisdiction over do not exist. In fact a careful reading of the "Commission's Determination on Jurisdiction" (Section E.2.) shows that the Commission makes no such argument.

Other reasons for believing that the Commission puts little weight on the Jurisdictional View will be discussed later, and a competing view may provide the key to this conundrum. A different justification for double payment runs throughout the Order, from the initial summary to the final regulatory text. This is the Balancing View. This view is encoded in phrases such as "capability to balance,"[4] and is codified in the regulatory text itself as the first requirement for payment of LMP.

Although a major theme within the Order, the Balancing View has apparently gone largely unrecognized, because it is highly unorthodox yet often presented in a way that makes it seem to be equivalent to the standard Energy View. Both views concern the value of DR. The Energy View holds that a megawatt-hour (MWh) of reduced consumption (a negawatt, in popular parlance) is worth the LMP because it saves energy. The Balancing View, however, holds that it is worth the LMP because it actively helps to balance supply and demand in the wholesale market.

Obviously balancing a MWh of demand with DR requires a negawatt-hour of DR, so it might seem the two views (Balancing and Energy) are indistinguishable. But in paragraph 9 of Order 745, where the Balancing View is definitively introduced, the Order defines DR as being provided in two ways. First, some (Non-Bid) DR provides negawatts that are *not* bid into the wholesale market, and second, other (Bid-In) DR provides negawatts that *are* bid into the wholesale market. Even though they provide the same negawatts to the wholesale market and reduce needed supply by the same amount, Non-Bid DR need be paid nothing by the ISO or RTO, while Bid-In DR must be paid the LMP. Clearly, the Commission is associating the LMP payment with balancing and *not* associating it with energy or negawatts. Just as clearly, this is not the standard Energy View.

But what does this unorthodox Balancing View gain the Commission? First, it protects the Commission from any jurisdictional problems it may encounter regarding the Order's effect on the retail market. This will be discussed starting in Section 7. Second, it protects against the charge of double payment. In the Commission's view, the wholesale market pays for wholesale balancing, and the retail market pays for negawatts—two different payments for two completely different services.

2. The Consequences of Double Payment

Double payment implies paying more to save energy than it costs to generate the energy saved. Obviously, this is not cost effective. However, current retail energy rates are also not cost effective. So the complaint against double payment is not that it is inefficient, but that it is likely to be more inefficient than the present arrangement and that it could be improved by simply not paying double. This would eliminate the need for the mandated, but inaccurate and burdensome, net benefits test.

Besides wasting money, double payment also causes arbitrary lines to be drawn between those who benefit from double payments and those who do not. This results in discriminatory and capricious treatment. The first case of discriminatory treatment, described in the next section, occurs between generation located behind a retail meter, which can pass for DR, and generation located in front of the meter, which cannot. The second case occurs between DR that is bid into the wholesale market ("Bid-In DR") and DR that is not bid into the market ("Non-Bid DR"). This is described in section 5.2. A third case, which is not discussed, occurs between Bid-In DR when the LMP is below the net-benefits test Price Threshold and Bid-In demand when LMP is above the price threshold.

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[4] Order 745 at Summary, PP 2, 47, and page 97.

The net benefits test, which forbids DR that it finds not to be cost effective, is needed only because of double payment. If the wholesale market paid LMP – G to demand response, then DR would "receive the LMP," and that would automatically be cost effective.

The fundamental flaw with the net benefits test, as Dr. Alfred E. Kahn made clear (and as described later), is that it should be a long-run test. It needs to measure net benefits over, perhaps, a ten-year horizon instead of a one month horizon, or as the Commission has planned, over a one hour horizon. This makes the test completely invalid. But, on top of that deep flaw, there is a trivial accounting error in the cost formula propounded by the Order. While the Order says that cost is proportional to the LMP, it is actually proportional to the retail energy rate (G).

The next three sections address the inefficiencies and the discriminatory nature of double payment. That following section discusses the net benefits test, and the final sections returns to solve the double-payment conundrum.

3. Preferential Treatment Resulting from Double Payment

Demand response competes with supply, and if this competition takes place without preferential treatment it will reduce the average MWh cost of electricity to consumers. However, double payment is inevitably preferential and the inefficiencies and arbitrariness of this treatment are most easily seen by considering an example of distributed generation. That is generation that is associated with load and placed behind the retail meter. Such an arrangement, if bid into the wholesale market is covered by the Order 745 mandate to pay the LMP.

Consider a real-world example. Bloom Energy offers to sell its customers energy (as Bloom Electrons) from an on-site "Bloom Box" at a rate up to 20 percent below the retail energy rate.[5] A retail energy rate of $100/MWh is relatively low in California, but assumes that $100 is the rate. To simplify calculations, assume Bloom Energy installs Bloom Boxes behind Google's meter and sells the power to Google for $100/MWh and bids the resulting DR into the wholesale market.[6]

Now suppose the generator has a marginal cost of $120/MWh. Since current estimates of the net-benefits Price Threshold put it in the $30 to $50/MWh range, we can conservatively assume it is $60/MWh. This means the DR generator can bid that low if it chooses, and it will so choose if it can earn a profit. Table 1, below, shows the results.

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[5] See http://www.engadget.com/2011/01/24/bloom-electrons-pay-what-you-consume-service-thinks-outside-the/ and http://www.Bloom Energy.com/newsroom/ or http://c0688662.cdn.cloudfiles.rackspacecloud.com/downloads-pdf-release-bloom-electrons-1-20-2011.pdf

[6] The Commission notes without objection that "EPSA states that paying LMP for demand response will merely encourage load to switch to off-grid power (or behind-the-meter generation), while still being compensated." Order 745 at P 34. Indeed, behind-the-meter generation is a common form of Bid-In DR.

Table 1. The Same Generator on Two Sides of the Retail Meter

	MC = $120. Retail Energy Rate = G = $100			
	Behind the Meter (DR)		In Front of the Meter (Supply)	
	Paid	Profit	Paid	Profit
LMP	LMP + G	Paid − MC	LMP	Paid − MC
$60	$60 + $100	$40	Generator would not bid	
$120	$120 + $100	$100	$120	$0
$420	$420 + $100	$400	$420	$300

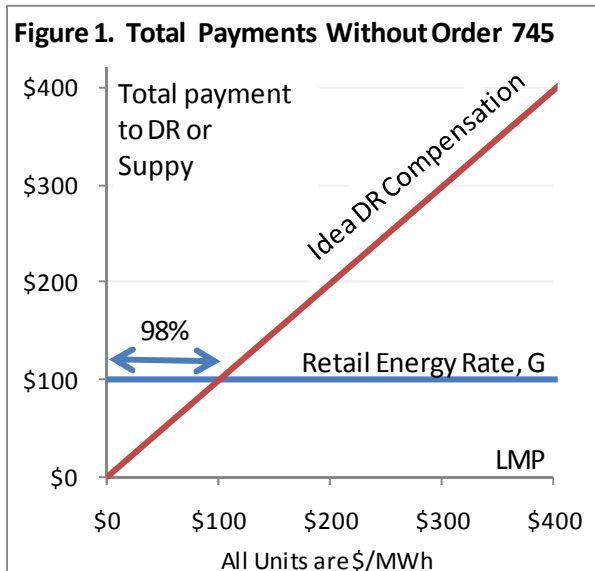MC = Marginal cost. All $ units are $/MWh. Profits are short run.

At an LMP of $60/MWh it makes no sense for a generator with an operating cost of $120/MWh to sell power—unless it can be paid twice. So, as Table 1 shows, the supplier does not bid in or sell power at $60/MWh, but the Bid-In DR provider bids in at $60/MWh and turns a handsome profit of $40/MWh. Here we can also see what economists mean by the double payment being inefficient. Providing DR costs $120/MWh, but the same power could be purchased for, say, $61/MWh from a supplier in the ISO, and yet Order 745 assures that the $120 power will be bid in at $60 and will be purchased instead of the $61/MWh power.

In this example, the only difference between Bid-In DR (behind the meter) and normal supply (in front of the meter) is the location of the generator relative to the retail meter. If the generator is located across the street from the consumer and sells power to the ISO, it receives less for its services by $100/MWh (the retail energy rate) than if it is located on the same side of the street and behind the consumer's meter. In either case, the same power is produced at the same time, and quite likely, the generator's power will mostly flow to the same consumers and be used at the same time for the same purpose. That a generator should suffer such a loss for simply being classified as a supplier would seem to be the very definition of arbitrary and capricious.

4. Picturing the Price Distortions

Present payments to DR providers are not ideal, and it is unrealistic to expect the Commission to provide a complete remedy for problems originating in the retail market. For this reason it is desirable to gain at least a rough understanding of the magnitudes of the retail and wholesale payments.

As the diagonal line in Figure 1 shows, the ideal reward for DR is the same as for supply, and it is the LMP. Retail energy rates, as shown in Figure 1, usually do not increase with the LMP, but remain constant. As can be seen, the retail energy rate,

Figure 1. Total Payments Without Order 745

which is the reward for reduced consumption is greater than the ideal value, the LMP, whenever the LMP is less than $100/MWh, the retail energy rate in the present example. Because the average value of LMP in the California ISO is $40/MWh, such high wholesale prices occur infrequently. In fact, the retail energy rate, which is the retail-market's reward for DR, is greater than the ideal price 98 percent of the time.[7]

Order 745 increases the compensation to DR by paying the LMP on top of the retail energy rate, as shown in Figure 2. However it does this only when the LMP exceeds the "Price Threshold"[8] determined by the net benefits tests. Early indications are that this threshold will be about $50/MWh in the California ISO, so Figure 2 shows LMP payments being added on, starting with an LMP of $50/MWh. The result is, of course, total payments to DR that are too high by the retail energy rate G whenever LMP payments are allowed.

Although Order 745 never gets the price right, notice that it does come closer to the ideal than the retail energy rate for high values of LMP. For example when the LMP is $300/MWh (Figure 2), total payments under Order 745 are only $100/MWh too high, while without Order 745 they are only the retail energy rate, which is $200/MWh too low. Consequently during the roughly 1 percent of the hours in which the LMP is very high, Order 745 should reduce the price distortion, and hence may improve the efficiency of the market.

Figure 2. Total Payments under Order 745

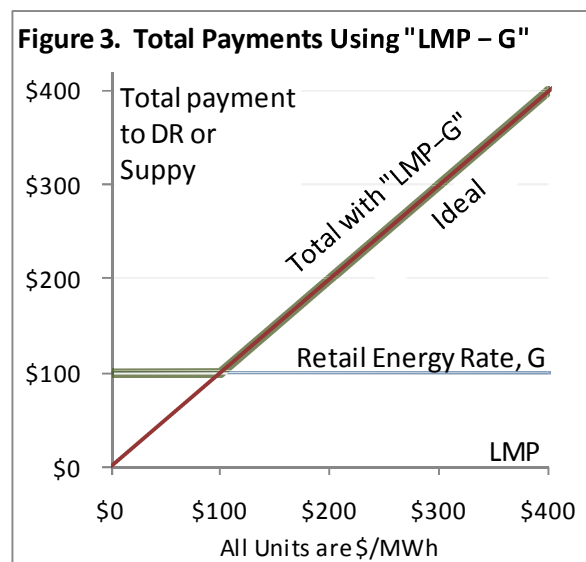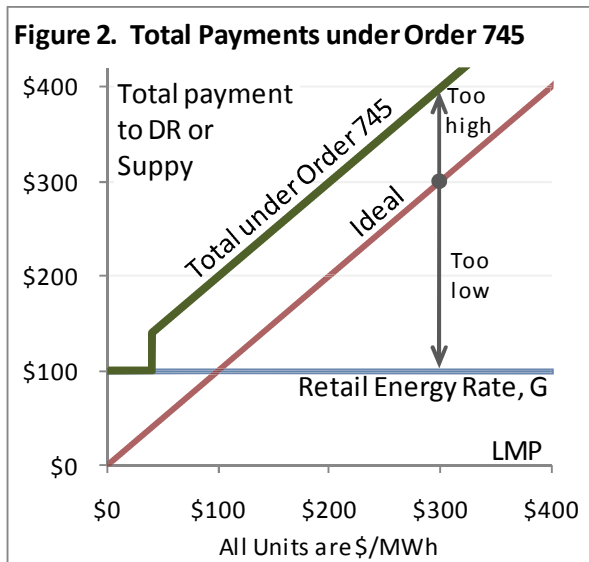Figure 3. Total Payments Using "LMP – G"

Figure 3 shows the most often recommended alternative to 745, and the one favored by the California ISO. It is designed to add just enough to the retail energy rate to bring it up to the ideal level, whenever the retail energy rate is too low. Since this only improves the market, there is no need for the complex and erroneous net benefits test. As can be seen, the net benefits test makes only a very small dent in the problems created by Order 745, because it grossly miscalculates the proper Price Threshold. We will return to this later.

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[7] CAISO, Market Issues and Performance: Annual Report 2010, Department of Market Monitoring, Figure 3-10.
[8] Order 745 at P 119.

5. Distorted Prices Lead the Market to Wasteful Outcomes

The high profits flowing to the DR provider in Table 1 will attract competitors, and if the DR market becomes fully competitive, DR provider profits will be driven down to a normal level. This might seem to eliminate the problem of double payment, but it does not. The essential problem is not that DR providers will earn excess profits, although for a while they will. Instead, the problem is that double payments will misdirect the market and cause it to perform inefficiently. This is frequently the case with subsidies that cause a price distortion, and its impact can be understood with a simple analogy.

Suppose hand-blown bottles (similar to behind-the-meter DR) cost $1.00 to manufacture including a normal rate of return. Next, suppose a new machine process for making bottles (similar to normal, in-front-of-the-meter supply) has entered the market and is producing bottles for $0.80. The glass blowers petition the government and win a subsidy of $0.40 per bottle for hand-blown bottles. What is the result? In effect, hand-blown bottles can now be produced at a cost of $0.60 ($1.00 minus the subsidy), so they will drive machine-blown bottles out of the market. But then, since hand-blown bottles are now artificially cheap to produce, competition will continue to drive the price down until they are selling for $0.60 a piece. So glass blowers are back to where they were, getting paid $1.00 per bottle, of which $0.40 is subsidy and $0.60 is the new low price for bottles. But in reality the bottles are costing consumers, considered as a group, just as much because the subsidy will be collected through a charge of some kind similar to the general uplift of LMP proposed by Order 745.

Also note that any consumers who value bottles at $0.70 will buy bottles costing only $0.60. This is wasteful, because the bottle actually costs $1.00 to produce and provides only $0.70 of value. So the low, subsidized price expands consumption to include bottles with a use value of less than $1.00. And, all of this new consumption is wasteful. Hence there are two sources of waste from this subsidy. First it causes the efficient technology to be forced out of business and replaced with the inefficient technology. Second, it causes inefficient consumer behavior.

The same two inefficiencies will occur under Order 745. First, it is technically inefficient to distribute generation behind the retail meters of a myriad of industrial, commercial and retail customers. But, that is what double payments will induce, as demonstrated in Table 1.

Second, consumers will choose to avoid the use of high-value energy. For example, a consumer may initially be using energy with a value of $120/MWh when the retail energy rate is $80 and the LMP is $80. Such "consumer surplus" is highly beneficial. But under Order 745, a Bid-In DR program could induce that customer to give up that surplus value, because the customer would be rewarded with $80 + $80 (LMP+G) for giving up a $120 value. The result is that $120 of value is given up to save the $80 cost of generation, the LMP.

Note that once the Commission puts the LMP subsidy in place, the market will determine the mix of DR and normal supply, and also the pattern of consumption. As the Commission explains:

> *In other words, while the level of compensation provided to each resource* [double payment] *affects its willingness and ability to participate in the energy market, ultimately the markets themselves will determine the level of generation and demand response resources needed for purposes of balancing the electricity grid.*[9]

But what the Commission fails to explain, and may not understand, is that when the regulator distorts the price signal—for example with double payment—"ultimately, the markets themselves will determine" *a distorted and inefficient* "level of generation and demand response resources."

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[9] *Id.* at P 59.

5.1. Can Double Payment Be Justified by Market Imperfections

The Commission claims that arguments stating the Order is inefficient fail to acknowledge the market imperfections caused by the existing barriers to demand response."[10] There are indeed significant market imperfections caused by existing barriers to demand response. But does that justify a uniform subsidy to all forms of DR, even behind-the-meter diesel generators?

This question is of crucial importance, because the central justification of DR and Order 745 is to overcome market imperfections that create barriers to demand response.[11] Although such barriers are mentioned numerous times, the Order fails to describe any and fails to explain how it would remedy any market imperfection except what it sees as the imperfection of wholesale electricity prices. This may be because all other market imperfections are in markets outside of its jurisdiction. Nonetheless it seems difficult to remedy imperfections in markets the Commission feels it cannot consider.

Market imperfections vary from minimal, in cases where DR is already working well, to nearly insurmountable for barriers preventing real-time residential pricing. So a uniform payment of LMP cannot be appropriate. But the essential questions are whether the Order will cure more imperfections than it causes, and whether it could not do much better.

The basic answer is that when over-compensation is applied to consumer decisions that are being made rationally, this will cause a market imperfection. But when over-compensation is applied in the right amount to certain types of barriers the overpayment can increase efficiency. However, when applied to other types of market barriers, efficiency is decreased. The two types of barriers are (1) customer misperception of savings, and (2) unnecessary costs.

A classic case involving misperceived savings is a 1975 model refrigerator. Consumers had no idea how much they would save in reduced electricity costs with different models, so they grossly undervalued the savings that was available with some models. If consumers believe a $100 savings is worth only $25, then paying them even $300 to choose the efficient model may be cost effective to society. This is because the payment is not a social cost but only a transfer of funds between consumers who do not participate (someone must fund the $300 subsidies) and those who do. So the net effect on efficiency is simply that the consumer makes a more cost-effective choice. This is not to suggest that such a payment is the best policy. The policies actually pursued were to put efficiency labels on refrigerators and require manufactures to increase refrigerator efficiencies. These policies did, in fact, reduce the cost of owning and operating refrigerators.

Since such policies have been applied to a wide range of home appliances, this may well have removed many market imperfections, and consequently a policy of overpayment may now result in causing a market imperfection instead of removing one.

An example of an unnecessary cost is a home that is not adequately insulated when built and for which the high cost of retrofitting insulation makes doing so uneconomical. Although this "barrier" can be overcome with higher DR payments, that does not change the fact that the retrofitted insulation is uneconomical. In this case, the cost effective decision is not to insulate, and the higher DR payments cause inefficiency.

5.2. Creating a Barrier to Efficient Retail DR

One barrier, although outside the Commission's jurisdiction, is directly addressable by the Order. That is the problem that retail energy rates, which do not reflect the true cost of power—the LMP. Of course, it

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[10] *Id.* at P 61.

[11] [T]his Final Rule is designed to remove barriers to demand response participation in the organized wholesale energy markets." Order 745 at P 113.

would be best to fix this in the retail market because fixing it in the wholesale market requires paying for energy not consumed (a vexing problem), while fixing the retail rate involves no such hypothetical accounting. Under a retail energy rate equal to the wholesale price (LMP) the reward for not consuming is not having to pay the true (sometimes high) price of power.

But what if a retail market did offer a retail rate of LMP, which would provide the correct reward for DR, including appropriately strong incentives when the system most needs DR and the LMP is extremely high? Under Order 745, the wholesale market would also pay the LMP to Bid-In DR so the total reward for Bid-In DR would be LMP + LMP. This precise form of double payment is so obviously incorrect that it is unlikely to be supported by any public utility commission. So customers are unlikely to be allow the option of a retail energy rate approximating the wholesale LMP, which is perhaps the best DR policy. Hence Order 745 interferes decisively with retail rate setting, and it works against the implementation of more accurate and effective retail prices.

However, if the Order 745 had instead required paying all demand response LMP − G in the wholesale market on top of G in the retail market, the Order would not interfere at all with retail rate setting. In fact it would encourage better rate setting. The result of this policy would be that the total payment for DR would be LMP–G + G, or simply LMP, for any choice of G, and even for G equal to the LMP. As a result, public utility commissions would see that by requiring DR customers to accept an accurate retail energy rate equal to the LMP they can eliminate the vexing inaccuracies and gaming opportunities associate with wholesale payments for energy not consumed.

To summarize the Order's impact on market imperfections, double-payment will introduce some new market imperfections and will not address many other imperfections in a sensible manner. Most imperfections, since they lie far outside of the Commission's jurisdiction and are quite idiosyncratic, are not well addressed by the broad brush of wholesale payments. Moreover, the one imperfection— inefficient retail pricing—that could be addressed in the wholesale market has been addressed incorrectly. And, this will create an additional barrier to implementing accurate retail energy rates, when the Order could, instead, easily have been written to encourage better retail pricing.

5.3. Preferential Treatment of Bid-In DR is General

The example in Table 1 concerns behind-the-meter generation, a common kind of Bid-In DR. However, other kinds cannot be operated in front of the retail meter, because they are more closely tied to actual demand. For example, air conditioners might be cycled off, or lights turned off. This raises the question of whether the above analysis applies more generally.

Dr. Alfred E. Kahn is the first commenter quoted by the Commission with regard to the comparability of supply and demand. The quotation begins, "[Demand response] is in all essential respects economically equivalent to supply response." Because of DR's equivalence to supply, various types of demand response must also be, in all essential respects, economically equivalent to each other. And, for this reason, the above example, shown in Table 1, applies to all forms of Bid-In DR.

The problem illustrated in Table 1 is that the DR has the same value to the system (in saved generating costs) as does normal supply, but it is paid more. Now consider DR supplied by turning off a megawatt of lighting (across many establishments). It also has the same value to the system (in saved generating costs) as does normal supply, but it is paid more. The conclusion must be, that all types of Bid-In DR suffer from the same arbitrary and capricious advantage as does behind-the-meter generation.

The advantage of Bid-In DR is not just an advantage relative to supply, it is also an advantage relative to Non-Bid DR. If a retail customer implements its own DR program, but does not spend the time and money to qualify to bid in the wholesale market, it will not receive the wholesale LMP

payment. However if it contracts with a DR aggregator, which then bids the customers DR into the wholesale market, the aggregator will receive payments at the LMP. This is true even if the retail customer does not respond (just as wind, solar and nuclear do not respond) any differently to the ISO's dispatch because of bidding into the market. This arrangement is also unduly preferential toward Bid-In DR and hence toward DR aggregators.

6. Does the Net-Benefits Test Justify Double Payment?

The Commission's first justification for double payment is that it is cost effective, as demonstrated by the net benefits test. However, the supposed benefit that the test measures is not the value of eliminating some barrier to DR, but rather the depression of the market price. But depressing the market price, may be due either to a gain in efficiency or to market manipulation—the exercise of market power. Just as supply-side market power is exercised by withhold supply, so demand-side market power is exercise by withholding demand. The latter could well be accomplished by paying some consumers to reduce their demand. In other words the Order has a prima facie appearance of exercising market power. Consequently the question of what the net benefits test really measures is crucial to an understanding of the Order.

6.1. Overview

Paying LMP gives DR providers extra revenue, and the cost of these payments will be shifted onto all remaining power consumption. The Commission wishes to make whole the customers not participating in DR programs. It hopes to accomplish this by limiting DR payment to times when DR will cause a reduction in the LMP that is at least sufficient to offset the DR Uplift payments that the ISO will add to the LMP.

The net benefits test is based entirely on the supply curve. There is a point on any normally-shaped, electric-power-industry supply curve such that a 1% reduction in the amount of energy supplied (due to reduced demand) causes a 1% price reduction. The price at that point is the net-benefits-test "Price Threshold".[12] Above that price, and only above that price, a MWh of demand reduction paid the LMP will cost less than the savings to consumers from the reduction in the LMP—or, so it appears in a static analysis.

There are two main problems with the net benefits test. First, it's a short-run test and not a long-run test. Second, the test uses the cost to the ISO, when it is supposed to measure the cost to customers. In most cases this will underestimate costs. The problem with a short-run test is basically the same as with any short-sighted financial analysis. Saving money today may or may not indicate genuine, long-term savings or benefits. A household can improve today's finances by skipping the car payment, but before long, the car will be repossessed. The net benefits test counts as benefits revenues that are taken from essential low-cost generators. The generation owners will be stuck with this loss for a while. But, as will be seen, this trick may not last much longer than the trick of skipping car payments.

There is also the problem of whether the net-benefits test is simply measuring market power rather than real benefits. Market power exercised by actions that are not cost effective except for the fact that it changes the market price. Market power that depresses the price is called monopsony power. The net benefits test claims to look at actions (DR payments) that are not cost effective, then labels them as "costs." Then it finds those demand reductions that reduce the market price enough to save customers more than the cost of those actions.

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[12] Order 745 at P 119.

These findings fit the definition of market power perfectly. Costs are incurred that would not be worth incurring except for the fact they manipulate the market price. In other words, the Order's description of the test indicates that the test is measuring the benefits of monopsony power. Of course this was not the Commission's intention or understanding. And, in fact, the test does not work as intended. However, at the crucial Price Threshold, the test is, in fact, measuring short-run monopsony power.

The short-run nature of the test prevents it from capturing the lasting effects of short-run price reductions. Lower prices will curtail investment in new capacity and the resulting capacity shortage will push the market price back up. The net-benefits test will continue to falsely report that prices are depressed, even though prices are higher and only appear depressed relative to a higher new "normal" price. The new higher prices will cover necessary capacity costs plus the new cost of the ISO's payments for DR. At this point the car has been repossessed.
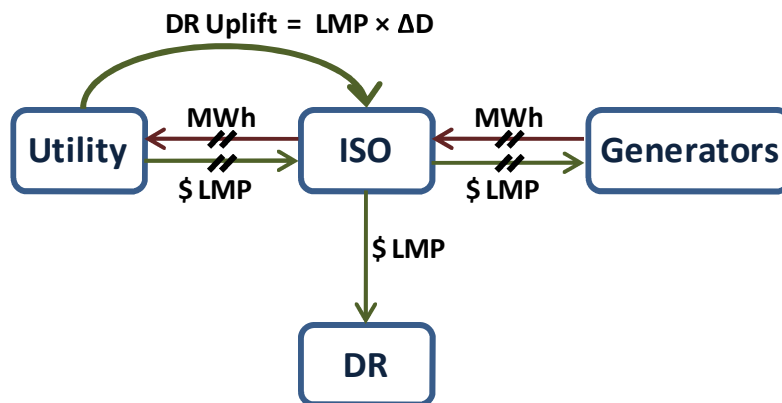
6.2. Correcting the Cost Side of the Net Benefits Test

Surprisingly, the easy part of the net benefits test—accounting for costs—is specified incorrectly. In paragraph 50 and footnote 119 of the Order, the Commission makes clear that the cost component of the net benefits test is to be calculated as LMP × ΔD, where ΔD is the amount of demand reduction. However, as I will now show, for utilities, the correct formula is G × ΔD, where G is the retail tariff energy rate.

The following analysis applies to utilities (a load-serving entity with retail customers), because they set a retail energy rate different from the LMP. If the wholesale DR costs originating in each utility were allocated as a "DR uplift," by the ISO to the originating utility, the calculation would be exact. But because there will be some cost shifting,[13] some consumers will experience a cost burden greater than G × ΔD, while other will experience a smaller burden. So cost shifting can reduce or increase the discrepancy described here, but it will not tend to reduce it on average. For simplicity I will examine a single utility without any such cost shifting.

Under Order 745, the ISO must pay LMP for Bid-In DR. This is shown in Figure 4 by the vertical arrow pointing to DR. But the effect of DR is to relieve the need for an equal amount of supply, which reduces by LMP × ΔD the payment the ISO makes to generators. This is shown by the hatch-marked arrows between the ISO and the generators. Finally, the load reduction from DR causes the LSEs to buy less power from the ISO at the LMP and this is shown by the arrows between those two market segments.
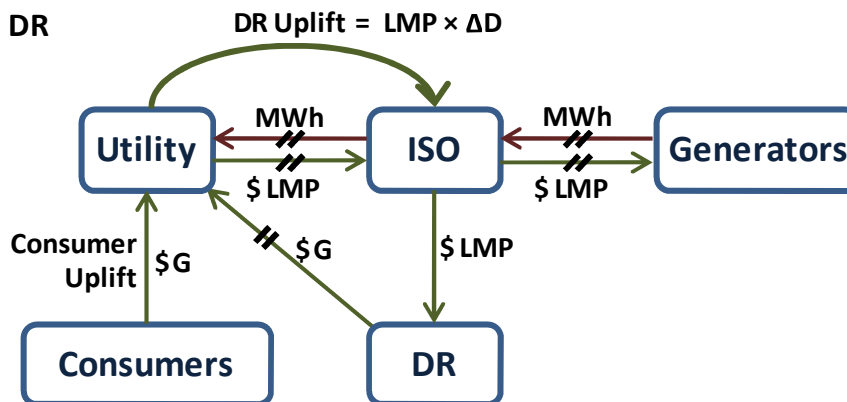
Figure 4. Does Cost = LMP × DR, or Zero ?

The Order states that the uplift should allocated "proportionally to all entities … in the area(s) where the demand response resource reduces the market price for energy." Order 745 at P 100.

The net effect on the ISO is that the reduced payment from the utility is canceled by the reduced payment to the generators, and all that remains is the payment of LMP × ΔD to the DR provider. But the ISO will simply pass that cost on in the form of an uplift to the wholesale price to be paid by the utility. This is shown by the curved arrow labeled "DR Uplift." But the commission speaks of "load paying the bill" and customers who "suffer a net loss,"[14] and so far, there are no load customers in the picture.

The Commission assumes that the utility will pass through the ISO's DR Uplift to consumers.[15] But does this make sense? Figure 4 shows that the utility is paying LMP × ΔD less for power and LMP × ΔD more for uplift. These two transactions cancel, leaving the utility with no additional cost to pass through to load. There can be no rationale for ignoring the utility's reduced payments for power, since those payments must be used to find the DR Uplift—the Commission's proposed cost. So, within the Commission's calculation framework, there will be no cost passed through to load customers.

Here, the Commission can draw the line and stop the analysis, as it seems wont to do, because it prefers not to take notice of the retail market. But this leaves it in the awkward position of performing its net benefits test when there is no cost for consumers to absorb. Moreover the result appears implausible. The only way to make sense of the costs imposed on consumers, at least within the accounting paradigm used by the net benefits test, is to finish the accounting. This is shown in Figure 5.

Figure 5. Cost = G × DR

Besides noticing the reduced need to purchase in the wholesale market, the utility will also notice that they are selling less power in the retail market and that their income is therefore reduced by the retail energy rate, G, times the amount of DR load reduction. Consequently, the Utility cost is not zero, as it seemed to be in Figure 4, but instead, it is G × ΔD. Hence, this is the cost that will be passed on to consumers, and this is the cost the Commission should be using in its net benefits test, and not LMP × ΔD.

6.3.   Why Short-Run Analysis Is Deceptive

Dr. Kahn as much as told the Commission that the net benefits test should be based on long-run calculations. He defined an "economically efficient demand response" by "comparing achieved saving with its costs, *both in present value terms*" [emphasis added].[16] This should be the Commission's definition as well. Note the use of "present value." This is the only instruction given by Dr. Kahn for computing net benefit, and without question, it implies that a long-run calculation is needed. There is no room for taking present values in the hourly calculations that the Commission is proposing for net benefits, nor would it make sense to do so with the temporarily-permitted monthly calculations.

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[14] Order 745 at P 50.
[15] *Id.*
[16] DR Supporters Sept. 16, 2009 Comments filed in Docket No. EL-09-68-000 (Kahn Affidavit at 9).

In other words, were Dr. Kahn still alive, he would tell the Commission that it is headed in exactly the wrong direction with regard to the net benefits test. Even some of the most egregious conceivable policies could pass a short-run net benefits test. For example, a policy to pay all suppliers their variable costs plus $2/MWh would keep suppliers in the market, and "save" huge amounts of money for consumers, at least for a while. But in the long-run, old generators would retire and no new ones would be built. Consumers would be forced to self supply or do without power, imposing costs far greater than the initial putative saving.

The same example that shows the failure of a short-run test, shows the success of a long-run test. Although the horrible policy just described passed the short-run test, it failed—just as it should have—the long run net benefits test. In the long run, the extra future costs of the policy would more than cancel the immediate cost savings. So a long-run test avoids the error of borrowing from the future and counting that as a present benefit that validates a short-sighted policy.

A perfectly competitive, efficient market will, in the long run, minimize the cost per MWh of electricity and this will maximize the net benefits to consumers. So the Commission's footnote 119 on the net benefits test, which checks the price of electricity, is in fact, a sensible approach—except for the fact that it checks only the short-run price effects.[17] However, converting to a long-run net benefits test is no simple matter.

6.4. Capturing Rents from Generators

At heart, the net-benefits calculation measures the transfer, from generators to consumers, of revenues needed to cover the fixed costs of generating capacity. This is revenue earned in the energy market, not in a capacity market or as capacity payments. There can be no question that this revenue, transferred to consumers, is needed by generators. On numerous occasions, the Commission has approved capacity payments and capacity markets designed to supplement this revenue because the Commission considers the revenue from the energy market to be inadequate. Hence the revenues must be needed.

The only possible justification for taking generators revenues would be that DR will make those generators redundant. But the net-benefits test itself demonstrates that this is not the case. Much, and likely most, of the rent transferred to consumers will come from generators with a marginal cost less than the net-benefits Price Threshold, while DR is only paid when the LMP is above this threshold. Hence these generators will never be displaced by Bid-In DR that passes the net benefits test.

For example, consider wind or solar generation. They have a marginal cost of zero, and consequently they will never be displaced by Bid-In DR, which operates only when the LMP is above, say, $50/MWh. However, the LMP will frequently be reduced by DR when these generators are producing power, and the revenue lost, which would have covered the capital costs of generator's capacity, will be recovered from consumers. This is not a savings to the market as a whole, and it is unsustainable in the long run.

The Commission may have missed this point because it avoided looking at capacity markets and, in doing so, seems to have avoided any analysis of the capacity revenues that are at the heart of the net benefits test. The Commission explains this lack of attention as follows. "This Final Rule is focused only on organized wholesale energy markets, not capacity markets. … Indeed, in some cases, the *capacity markets already **reflect** energy and ancillary service revenue* in determining capacity prices [emphasis added]."[18] Consider what is meant by the word "reflect." As noted above, generators receive revenues

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[17] It may seem surprising that there is no need to check on benefits to suppliers. But, under perfect competition, in the long run, they all earn normal profits (plus or minus some random errors). This is true whether a DR policy is efficient or inefficient, So to find the most efficient policy it is only necessary to look at benefits to consumers in the long run.

[18] Order 745 at P 85.

from the energy market to cover their fixed costs, but these revenues are inadequate. Capacity markets "reflect" this inadequacy by providing the needed additional revenue. Implicitly, the Commission is acknowledging that the generators do need the revenues that Order 745 transfers to consumers.

This discussion is best understood with the help of Figures 6 and 7, which show the source of the "benefits" in the net benefits test.

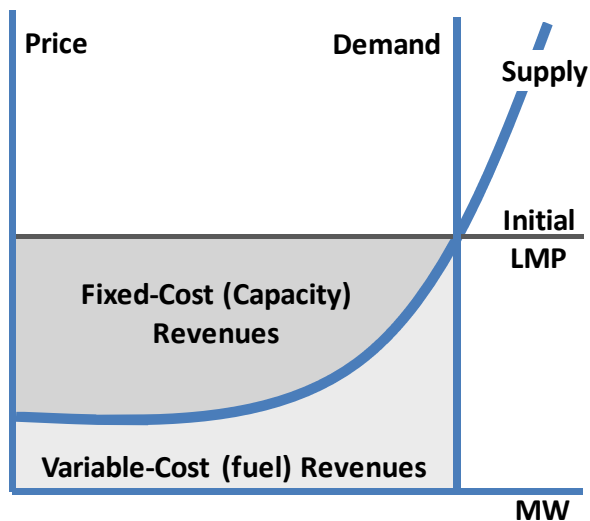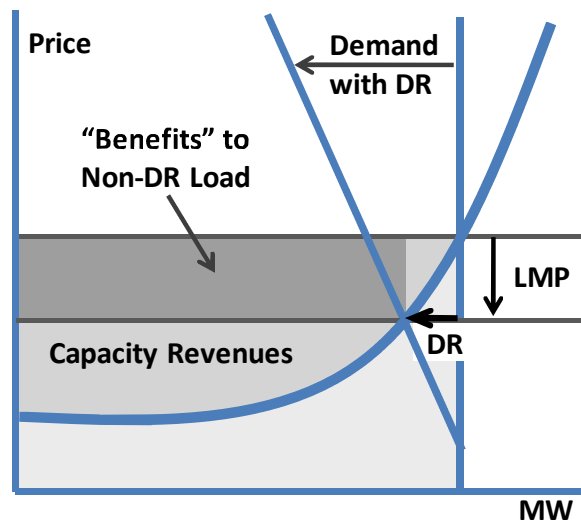**Figure 6. Capacity Revenue**

Figure 7. "Benefits"

As shown in Figure 6, energy market revenues cover variable costs because suppliers generally offer prices close to their variable costs. But, because all suppliers are paid the variable cost of the most expensive generator dispatched—the marginal generator—they earn infra-marginal rents. These are the "Fixed-Cost Revenues," mainly used to pay the cost of generating capacity. As discussed above, these are necessary payments, and the Commission has often approved additional capacity payments because these energy market payments alone have been inadequate.

Figure 7 shows a Bid-In DR program in operation. It reduces demand by the amount labeled "DR," and that causes a reduction in the LMP as shown. Reducing the LMP transfers revenues from suppliers to consumers in the amount shown by the dark gray rectangle labeled: "'Benefits' to Non-DR Load." Notice that the revenue comes from the generators that are still supplying power even with the DR program in effect. These are the generators with the lowest marginal cost. If the lower LMP shown is the Price Threshold, then all of the "Benefits" revenues are coming from generation that can never be replaced by Bid-In DR because the net benefits test does not allow it.

Note that there is another benefit that is, at least in part, a real cost savings and not simply a transfer of funds. This is the cost savings that can be seen under the supply curve and directly above the DR arrow in Figure 7. Apparently DR is providing negawatts more cheaply (at the lower LMP) than these generators had previously been supplying megawatts (at the higher LMP). Were it not for the fact that Bid-In DR is overpaid by the retail energy rate, this would be a good indication of the savings that DR can provide.

6.5.   Why the "Benefits" Will Not Last

Although Figure 7 shows a transfer from suppliers to load, this is unsustainable. Such transfers will leave most generators with a sub-normal return on equity, which means the supply side will either (1) slowly collapse or (2) the market will correct the problem by raising prices and putting an end to the

transfers—putting an end to the "benefits" in the net benefits test. There is no other way. All investment in new generation will cease until the market again begins to cover capacity costs.

First, consider DR programs that are so strong that they permanently prevent the need for new capacity while the old capacity slowly retires. In the end, all generation will take place behind the retail meters under the guise of demand response. In this case, DR programs could continuously siphon off the capacity revenues of existing generation. This would speed the rate of retirement and result in a loss of value for all existing generators. If this were to occur simply because the Commission has allowed a more-efficient type of competitor into the market, then the loss of value could not be criticized. But, instead, under Order 745, this outcome would occur, because DR providers are receiving LMP+G, while normal supply is receiving only LMP. Since this is a discriminatory pricing policy, the loss of value it causes will constitute a regulatory "taking."

However, the second possibility seems far more likely. In this scenario DR programs will not be strong enough to keep ahead of both load growth and generation retirement. As a consequence, some (though less) new investment will remain necessary. But, as always, the market will refuse to invest at all until it anticipates normal capacity revenues. This will happen only when the average LMP (not including the uplift shown in Figures 4 and 5) has returned to the original level. Most likely, the market will handle all this in its normal fashion. There will be a slight shortage of capacity, and that will drive up spot prices (the LMP), just as it has before.

So the likely outcome is that the transfer of benefits to load will end without any disruption. Fortunately, markets are quite robust. However, the result will be that the short-run net-benefits test of Order 745 will continue to assure load that it is successfully picking the pockets of generators, but this will be an illusion. In reality non-DR load will be paying for the subsidized costs of DR programs. Because of the inefficiencies in this arrangement, rates will rise, and eventually non-DR load will discover that it is their pockets that are being picked and not those of the generators.

6.6. Market Power and the Net Benefits Test

In the short run and as the net benefits test suggests, Order 745 will transfer revenues from generators to consumers. This raises the question of whether or not this short-run transfer is simply the result of market power as the net benefits test implies.

To understand that this transfer is not necessarily due to market power, consider what would happen if Order 745 required a payment to Bid-In DR of LMP − G instead of LMP. Paying LMP − G would mean DR providers were not paid more in total than suppliers. This policy produces incentives that are identical to a market in which the retail energy rate is set to the LMP, and that is agreed by all to be efficient.[19] In other words, having the ISO paying LMP − G would eliminate the exercise of market power.

But even without market power, there could still be a large DR response whenever the LMP is significantly above the retail energy rate. This would reduce the LMP in these hours and transfer revenues from generators to load exactly as the net benefits test assumes. Hence the mere transfer of these revenues is not evidence of market power.

But with no market power and an efficient price, why would the net benefits test still show a cost? According to the Commission that cost would be (LMP–G) × DR. In fact, the net benefits test would still show costly programs leading to net benefits by manipulating the market price—a clear indication of market power. But, as before, the net benefits test is simply wrong.

As shown in Section 6.2, the actual cost to consumers is not LMP, but instead it is G. So when the payment is reduced from LMP to LMP–G, the cost is also reduced by G, so it drops from G to zero. In

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[19] Identical except for the incentive to cheat.

other words, the corrected test shows that no money is wasted in order to depress the LMP. So when LMP−G is paid for Bid-In DR, market power is not exercised and the cost-corrected net benefits test agrees.

I now turn to the case in which the net benefits test surely does indicate an exercise of monopsony power. Under Order 745, Bid-In DR receives a double payment, which causes some demand reductions to be costly—these would make no sense unless they were able to reduce the market price. These demand reductions are an exercise of monopsony power. The case in which this is absolutely clear is the case in which the LMP is less than the retail energy rate. In that case, the reward for DR is too great even before the payment of the LMP, and so that payment can only make matters worse. Hence, when the net benefit test is used for LMP values below the retail energy rate, G, it is simply reporting short-run monopsony power and is not measuring any real benefit.

7. The Double-Payment Conundrum: Alternative Views

As explained in Section 1, Order 745 argues that the wholesale price (LMP) "represents the marginal value of … a reduction in consumption."[20] The Commission then concludes that demand response "should receive the LMP for services provided."[21] However, under Order 745 qualifying DR will receive instead, LMP + G, where G is the retail energy rate. How does the Order justify this discrepancy? That is the "conundrum" discussed in Section 1, and it will now be taken up in more detail.

The most prevalent explanation of this puzzle assumes that the Order is based in part on the standard "Energy View" of DR, which can be defined as follows:

Energy View: The service for which DR is paid is its reduction in the demand for energy, and the value of this service is the value of the energy saved, which is LMP. Hence DR should receive for its service, in total, the LMP times the saved energy.

Stated more succinctly, DR provides negawatts (megawatts of energy savings) that should receive the same LMP reward as megawatts. This is a well-established view, and it is exactly what happens if consumers are charged the wholesale price of energy as the energy part of their retail bills.

Since DR is already rewarded by avoiding the retail energy rate, G, the Energy View clearly implies that an additional reward of LMP − G is required, no more and no less, whenever G is less than the LMP. Hence, on its own, the Energy View does not explain the Order's insistence on paying DR the LMP in the wholesale market. So the standard explanation of Order 745 holds that the Commissions also subscribes to the following Jurisdictional View.

Jurisdictional View: The Commission cannot take into account the retail energy rate, G, because the retail market is not within its jurisdiction, and therefore must assume G does not exist.

Obviously, the Commission does hold this view in part—it does not claim retail jurisdiction, and at times it seems to nod in the direction of using it to explain why it ignores G. So there is some truth to the standard explanation. But the next section argues that relying on the Energy View and the Jurisdictional View together makes an extraordinarily weak case for ignoring G. Moreover, the Commission avoids making this reliance explicit, quite possibly because the case is so weak.

Instead of relying on these two views, the Commission appears to build a case for, and rely on, a third view, the Balancing View, which is defined as follows:

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[20] Order 745 at P 53.
[21] *Id.* at P 53.

Balancing View: If DR bids into the wholesale market, it provides the same balancing services as does supply and hence it should be paid the same—the LMP. But if it does not bid in (or self schedule), it need not be paid anything by the wholesale market.

Implicit in the Balancing View is the idea that negawatts are, and should be, paid for in the retail market and the Commission should not try to correct retail energy rates. The Balancing View can replace both the Energy View and the Jurisdictional View, because it explains both why LMP is the correct total payment and why G should not be taken into account. In the Balancing View, G is the reward for retail negawatts, and LMP is the reward for balancing the wholesale market. Hence, there is no double payment, because the two payments are for different services.

8. Does the Order Rely on the Energy and Jurisdictional Views?

The Energy View holds that the DR should receive a total reward of LMP for providing negawatts, and that G is, for this reason, sometimes insufficient. If the Commission accepts this view, it has accepted the fact that the problem being solved is a distorted retail energy rate. But if this is the case, the Commission has already admitted that is should take account of G, because the entire purpose of the Order is to correct the problems caused by an inappropriate G. Hence it could not rely on the Jurisdictional View, which holds that it must ignore G entirely.

The Commission seems well aware of this contradiction and apparently rejects the Energy View which identifies the problem as correcting the distorted retail energy rate. The Commission summarizes commenters as saying "it is better to get the wholesale rate right in the first instance and then allow retail energy rate structures to adjust as needed to wholesale market conditions".[22] It then quotes Dr. Kahn to back this up. In its subsequent Determination, it does not contradict these views and appears to agree with them.

Also, adopting the combined Energy and Jurisdictional Views implies that the wholesale rate specified by the Order is actually incorrect, and that it has been adopted only because the Commission has been prohibited from taking account of the information (G) required to set the rate correctly. But the Commission gives many indications that it does not view paying the LMP as an approximation. Nowhere does it make anything like the statement that would be expected if it held the Energy and Jurisdictional Views: that it knows LMP – G is the correct policy but its hands are tied. Instead it argues vigorously that LMP is the correct policy and LMP – G is incorrect in principle.

The Jurisdictional View also appears flawed. It appears to be based on a general principle that the Commission cannot take into account any factor that it does not have Jurisdiction over. There appears to be no necessary connection between these two concepts.

These considerations lead to the question of whether the Order has, in fact relied on these two views to justify not taking account of G. If it did so rely, one would expect to find this under the Commission's "Determination on Jurisdiction," in Section E.2. That Section consists of four paragraphs. Paragraph 112 claims authority to set wholesale rates for DR. Paragraph 113 furthers that claim. Paragraph 114 states that the Order "is not regulating retail energy rates or usurping or impeding state regulatory efforts concerning demand response." This would be the point at which to make a claim that taking account of, G, would impede "state regulatory efforts," but this claim is not made. Indeed it would seem to be impossible to make, given that, as written, the Order is, in fact, impeding state regulatory efforts in California, and that had the Order taken account of G, this would not have been the

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[22] *Id.* at P 111.

case. The final paragraph simply adds that the Commission is obliged to set just and reasonable rates and that that is its only intention.

Since the Commission did not bother to justify the most contentious point in the Order—ignoring the retail energy rate—in its determination on Commission Jurisdiction, it seems unlikely that the Commission is relying on the Jurisdictional View for that purpose. In the rest of the Order the most relevant remark seems to be the following:

> *"While a number of states and utilities are pursuing retail-level price-responsive demand initiatives …, these are state efforts, and, thus, are not the subject of this proceeding."[23]*

This claim is only about DR initiatives and not about the retail energy rate, and it only appears to indicate that the Commission is not interfering with retail matters, which does not imply it cannot take them into account.

In summary, the Commission does not appear to rely substantially on either the Energy View or the Jurisdictional View. And to the extent it does rely on this pair of views to justify ignoring the retail energy rate, its reliance is contradictory and ineffective.

9. Is It Possible that the Commission Relies on the Balancing View?

The Balancing View is an alternative to the combined Energy and Jurisdictional Views. This view explains both why the wholesale market should pay the LMP to some DR (Bid-In DR) and why it should ignore the retail energy rate.

In a peculiar way, this view may not contradict the Energy View. The Commission may believe that all negawatts should be paid the LMP by the retail market, but with an unusual addendum. The wholesale market should also pay DR the LMP, but for wholesale services other than negawatts. When attempting to understand the Balancing View, one should not assume that it is internally consistent or sensible. It is simply a somewhat-coherent collection of beliefs that apparently underpins Order 745.

Obviously DR does help balance supply and demand just as does supply, and obviously when it does so, it provides negawatts (load reductions). So to someone who understands energy markets, it may appear that the Commission is just expressing itself oddly when it keeps referring to balancing as "the service [DR] provides".[24] It may appear that when the Commission says "balancing" it is mainly referring to the "service" of providing negawatts (reduction in load), a service that occurs whether or not the negawatts been bid into the wholesale market. In other words, "balancing" might just be an awkward description of the Energy View—negawatts deserve to be rewarded at the LMP. However, as is demonstrated below, the difference between the two views—Energy and Balancing—encompass physical and financial distinctions, and "balancing" is not simply an odd way of referring the Energy View. When the Commission refers to "balancing" it appears primarily to mean actions such as bidding that are associated with the ISO's activity of balancing, and not to mean the negawatts that necessarily accompany this activity. The strongest evidence for this interpretation is that the Commission mandates payment for negawatts if and only if they are accompanied by bidding or some similar activity in the wholesale market. As explained below, the Commission clearly states that negawatts alone do not need to be rewarded.

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[23] *Id.* at P 9.
[24] *Id.* at Summary.

9.1. The Commission's Explanation of the Balancing View

The "Balancing View" is most clearly described in paragraph 9 as follows:

> *Demand response, whereby customers reduce electricity consumption from normal usage levels in response to price signals, can generally occur in two ways:*
>
> *(1) customers reduce demand by responding to retail rates that are based on wholesale prices (sometimes called "price-responsive demand"); and*
>
> *(2) customers provide demand response that **acts as a resource** in organized wholesale energy markets **to balance supply and demand**.* [emphasis added.]

The Commission then states that "our focus here [in Order 745] is on … demand response that **acts as a resource in organized wholesale energy markets**." In other words, the requirement to pay demand resources the LMP applies only to the second of the "two ways" in which demand response can occur. We will refer to the second way as "Bid-In DR," and to the first way as "Non-Bid DR." These terms are loosely based on the Order's clarification of what it means "to act as a resource to balance supply and demand." The Order states,

> *Our focus here is on customers or aggregators of retail customers providing, through **bids or self-schedules**, demand response that acts as a resource in organized wholesale energy markets* [emphasis added].[25]

Notice that type (1) DR (Non-Bid DR) has no right under Order 745 to be paid the LMP. And this is true in spite of the fact that "customers reduce demand by responding to retail rates." If customers have reduced their demand, then the DR provider has provided the wholesale market with negawatts. This seems to contradict the Energy View under which all negawatts deserve to be rewarded equally. However, the Commission may feel that these negawatts should be paid the LMP in the retail market. This possibility is explored below.

Notice that type (2) DR (Bid-In DR) is distinguished form Non-Bid DR only by the fact that it "acts as a resource … to balance supply and demand." In other words, it is being rewarded, not because of the negawatts it delivers, but because of how it "acts" with those negawatts. This reinforces the point that the Commission has strayed very far from the standard Energy View, since that view holds that DR is paid the LMP for, and only for, a reduction in energy consumption.

Paragraph 10 gives further explanation of the value of Bid-In DR, by elaborating the Commission's theory of "ways in which demand response in organized wholesale energy markets can help improve the functioning and competitiveness of those markets."

> *First, **when bid directly into the wholesale market**, demand response can facilitate RTOs and ISOs in balancing supply and demand, and thereby, help produce just and reasonable energy prices* [emphasis added].[26]

So the first wholesale benefit of Bid-In DR, according to the Commission, is the result of its bidding, which facilitates balancing. The commission goes on to explain why this activity is valuable:

> *This is because customers who choose to respond will signal to the RTO or ISO and energy market their willingness to reduce demand on the grid which may result in reduced dispatch of higher-priced resources to satisfy load.*[27]

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[25] *Id.* at P 9.
[26] *Id.* at P 10.
[27] *Id.* at P 10.

This reveals more about the logic behind the Order than any other statement. "Customers who choose to respond" corresponds to the phrase "when bid directly" in the previous sentence. And, the paragraph as a whole is a justification for paying Bid-In DR while not paying Non-Bid DR. So the meaning of this sentence can be summed up in one statement that summarizes the quote above and one that summarizes the implicit companion statement concerning Non-Bid DR.

1. DR "bid directly into the wholesale market" … "may result in reduced dispatch of higher-priced resources."

2. Non-Bid DR will not result in reduced dispatch of higher-priced resources.

The second statement is wrong. If the demand response happens without a bid, it will still reduce load, and the system operators will not dispatch higher-priced resources to satisfy load that does not exist. Bidding is a help to dispatchers, but the act of bidding by DR, rather than just autonomously reducing load (providing the negawatts), will affect the dispatch very little. This is discussed further in Section 10.

There are two ways to interpret the Commission's views expressed in paragraph 10. Which interpretation is correct depends on what is meant by "reduced dispatch of higher-priced resources."

The no-price-effect interpretation: This may be intended to refer to simply replacing energy that would otherwise have been generated. In this case the Order's explanation of paying the LMP suggests that bidding allows negawatts of DR to replace megawatts of supply, while Non-Bid DR will fail to replace supply and hence need not be paid the LMP.

The reduce-the-LMP interpretation: But the reference to "higher-priced" supply seems to imply that the benefit of Bid-In DR is to reduce the market price—the LMP, and that Non-Bid DR will replace supply but it will fail to bring down the LMP. The next point in paragraph 10, that Bid-In DR can reduce market power, also seems to imply that Bid-In DR can reduce the LMP, but Non-Bid DR cannot. This interpretation—that Bid-In DR should be paid for reducing the LMP—also explains the mistaken idea that short-run reductions in the LMP constitute benefits in the net benefits test.

The first interpretation (no price effect) leads to an extreme Balancing View: Non-Bid DR negawatts fail to replace supply and so need not be paid the LMP, but Bid-In DR works according to the standard Energy View. The view that some DR negawatt are worthless seems highly improbable, given the Commission's support for DR. Consequently, it will be dismissed in favor of the second interpretation.

The reduce-the-LMP interpretaion leads to a slightly more plausible Balancing View, and this one will be shown to align with key aspects of the Order. The second interpretation holds that all DR negawatts are equally effective as described by the Energy View, but negawatts are rewarded in the retail market, and the Commission has no authority there, so it will not try to correct any problem with the reward for negawatts. However, Bid-In DR has the ability to reduce the use of high-priced dispatch and thereby lower the LMP, and this is a benefit that occurs in, and must be rewarded in, the wholesale market.

This view is extended and corroborated by the next two points in paragraph 10. First, that Bid-In DR can mitigate generator market power in the wholesale market.[28] The final point is that Bid-In DR can support reliability and system adequacy, again in the wholesale market.[29]

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[28] Again, it is incorrect that Non-Bid DR is any less effective. All DR adds to demand elasticity and that is known to be a primary factor mitigating market power in all markets, most of which have no bidding on either side of the market.
[29] Both Bid-In DR and Non-Bid DR can increase reliability, and both can fail to. But the point I am making is that the Commission is focusing on a purely wholesale service that it believes can justify its payment of LMP. However payments for reliability and adequacy are capacity payments and not energy payments, so they are not paid LMP, and they apply to capacity DR, which this Order does not cover.

Of the three explanations of how "demand response in organized wholesale energy markets" is deserving of a special reward, none concerns negawatts. Instead they all focus on services that appear to be linked to bidding and to the wholesale market. It appears that the Commission incorrectly believes that bidding gives the ISO control over the resource and that this is the source of value. However, as wind, solar and nuclear generation prove, bidding does not give control, and such control is not the reason that supply is paid the LMP.

In summary, the Balancing View holds that all DR deserves a reward for negawatts that will be paid in the retail market, but that Bid-In DR provides several important services to the wholesale market that together should be paid the LMP. First among these services is balancing. The LMP is the correct payment because the services provided are identical to those provided by supply which is paid the LMP.

9.2. Other Evidence for the Balancing View

In other markets, there is no ISO to make payments for balancing, so it seems odd to think that in electricity markets DR should be paid the entire wholesale price for balancing. The Commission appears to address this concern rather obliquely when it warns that:

> Commenters that oppose this finding [that DR can balance supply and demand] do not adequately recognize a distinctive and perhaps **unique characteristic of the electric industry. The electric industry requires instantaneous balancing** of supply and demand at all times to maintain reliability. It is in this context that the Commission finds that demand response can balance supply and demand as can generation when dispatched, in the organized wholesale energy markets [emphasis added].[30]

The Commission also quotes Dr. Kahn approving when he says,

> These circumstances—[the inability to charge the retail customers the LMP]—*can justify direct payment at **full LMP** to distributors and ultimate **customers who promise to guarantee their immediate response** to such increases in true marginal costs of supplying them* [emphasis added].[31]

There is simply no reason to put this much emphasis on balancing, especially on instantaneous balancing, if the Commission were interested in simply paying for negawatts. In fact all of the dozens of references to balancing would simply be irrelevant.

Finally it should be noted that there are only two tests required for DR to be eligible for being paid the LMP, and the first of these tests is that the demand response resource "have the capability to balance supply and demand."[32] What is telling about this requirement is that some DR resources must fail to satisfy this requirement. How can that be? All negawatts help balance demand just as all megawatts do. But there would be no reason for such a requirement if it were automatically met. Hence the fact that some fail, means the Commission is not basing payment on megawatts, but on other (balancing) services provided to the wholesale market.

> The Commission emphasizes that … it is appropriate to require compensation at the LMP … **only when** two conditions are met: The first condition is that the demand response resource has the capability to provide the service … that serves the RTO or ISO in balancing supply and demand [emphasis added].[33]

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[30] Order 745 at P 56.

[31] *Id.* at P 57.

[32] *Id.* at page 97.

[33] *Id.* at P 48.

Again, the Commission is making the point that some DR resources do not have this "capability to balance supply and demand." This cannot be explained by the standard Energy View, but is at the very heart of the Balancing View.

9.3. The Role of the Balancing View in the Order

The final reason to believe that the Commission relies on the Balancing View is that this is the only view in play that can solve the Order's most central problem: Why pay DR the full LMP when it already receives the retail energy rate, G? The Balancing View implies that common benefits of DR, apparently the benefits of negawatts, are rewarded in the retail market, and that the Commission should not try to correct the retail energy rates with wholesale policies even if they are flawed. This argument will not be as easily challenged in court because of its technical nature as the Jurisdictional View would be.

Having dispensed with G, the Balancing View solves the other half of the central problem by arguing correctly that DR that is bid into the wholesale market can provide the same services as can supply. This implies the FERC is only addressing wholesale market problems over which it has clear authority. The next step will also be difficult to challenge—since DR provides identical balancing services, it should be paid the same as supply for those services. The final step is that it should be paid the LMP by the wholesale market because supply is paid LMP for its balancing services.

10. Why the Balancing View Is Incorrect

Of course there is a flaw in the "logic" of the Balancing View just presented. Supply is not paid LMP for its balancing services. Supply does provide balancing services, but it also provides megawatts. And it is paid the LMP for its megawatts and not for balancing. There is only one supply service worth paying for, not two. And the same holds for DR. So whether DR is paid in the retail or the wholesale market, it is either being paid for that service (negawatts) or it is being paid for something that supply is not paid for and that DR should not be paid for.

The linchpin of the error is the fact that supply is paid only for energy and not at all for balancing. But, before delving into details of electricity markets, it is worth reviewing why there is generally no need to pay for the "balancing service."

10.1. Why Balancing Is Normally Free

In all normal markets, supply and demand have an incentive to perform the balancing service for free. Supply wants to sell its product at a profit. To do that, it must sell when the price is higher than its marginal cost, but not when the price is lower. While maximizing profit, suppliers inadvertently balance the market. Consumers act in a reciprocal way. When the price is high they choose to buy less, not in order to balance the market, but because they want less when the price is high. This is the essential beauty of markets. The market price acts as a coordinating mechanism that causes suppliers and demanders to balance the market inadvertently just because suppliers seek to profit and consumers seek to buy only when they the price is low enough.

10.2. Normal Balancing Services in Electricity Markets

Most natural demand response in electricity markets is exceedingly slow, but balancing happens on all time scales. For example, on the supply side, as demand grows, more generators are built as investors respond to high market prices. This is also exceedingly slow but it is an absolutely essential part of balancing the market, and it still follows the standard balancing principles of price response. Some plants, such as nuclear, solar and wind generators help balance the market only in this slow fashion.

When six nuclear plants are hit by a tsunami it becomes clear just how important they have been to balancing the market. Demand also responds to prices in this same long-run fashion.

But short-run balancing in an electricity market is done by plants that are price responsive in real time, although they respond at very different speeds. Coal plants are among the slowest, and storage-based hydro generators are perhaps the quickest. But all of these respond because they are chasing prices to make a profit. In Alberta some generators are known to "hide in the weeds" by bidding some irrelevant price, and producing little or no power. Then when the market gets tight (without them) they jump in and catch a few minutes of extremely high prices. Electricity suppliers are quite capable of responding to prices without bidding, just like suppliers in all other markets. Bidding can help them maximize their profits a bit more precisely and bidding helps the system operator plan better and buy fewer reserves. Because of the profit motive and the extremely low cost of bidding, balancing services from normal generator are not paid for.

10.3. The Exception that Proves the Rule

The instantaneous balancing service, often called "regulation" is unique to electricity markets and it is provided by generators that adjust their output up and down quite frequently in order to keep the area control error (ACE) within prescribed limits. There are relatively few of these generators and they are not paid the LMP for this service. Instead, they are paid a small amount for wear and tear and they are paid the LMP minus their cost of generation for the lost opportunity associated with providing headroom for regulation.

So, while a few suppliers are paid for balancing supply and demand, this is the exception that proves the rule. Almost no suppliers are paid for balancing, and those that are paid for instantaneous balancing, are not paid LMP. Moreover, Order 745 does not appear to address the use of DR as a replacement for regulation.

10.4. When Do other Markets Pay for Balancing?

Besides the need for instantaneous balancing, which imposes a small cost on the market, the electricity market also has a need for scheduling and for measuring who is taking power out and who is putting it in. Consequently, electricity markets need something like the New York Stock Exchange. The NYSE accepts bids, clears the market, and validates the transactions. The cost is paid to the NYSE as a consequence of the buy-sell spread and comes to about 0.1% of the stock price (the NYSE's LMP). The cost of running an electricity exchange (an ISO or RTO) is similarly low, and the payment again goes to the exchange, and not to either suppliers or demanders.

So yes, electricity markets are different. Balancing supply and demand is not quite automatic and free, as it is in most markets, but the tiny balancing costs are paid to specialists—regulating generators and the ISOs and RTOs—and not paid to supply or demand.

10.5. Should Helpful Suppliers Be Paid Something for their Balancing Service?

The Commission has approved rates for every ISO and RTO that not only fail to pay any extra for balancing (other than for regulation), but also pay the LMP to wind resources that tend to unbalance the system. Of course many other resources, nuclear power plants, solar power, and run-of-river hydro, to name the most obvious, also provide no balancing service at all. They completely ignore the market price and simply generate what they can. In spite of this, they are all paid LMP.

But wind power provides the most revealing example. The wind pays no attention to the need for balancing and so, as likely as not, the wind will be increasing when less power is needed and decreasing when more power is needed. In fact, such fluctuations have been known to cause quite extreme

problems with balancing. In spite of this, wind energy is paid the LMP, just the same as generators that bid in and respond to the market price.

If balancing the wholesale market by actively responding to price deserves to be rewarded with the LMP then quick-ramping gas and storage-based hydro facilities should be paid more than wind turbines by the amount of the LMP. In this case, all current wholesale tariffs are unduly discriminatory.

10.6. Why There Is No Basis for Order 745

The retail market rewards DR with the retail energy rate, which, in the CAISO, is greater than the wholesale price 98 percent of the time and which is more than double the average wholesale price. This retail payment is much too significant to ignore when considering whether DR has been properly rewarded. In spite of this, the Commission has insisted on ignoring this retail compensation and insisted on paying DR the full wholesale price on top of the retail energy rate, G. The prima facie conclusion must be that this is double payment, and that the Order grossly discriminates in favor of DR and against normal suppliers of all types as well as against Non-Bid DR.

Two possible arguments are proposed as justifications for such double payment. The most prevalent argument appears to be a combination of the Energy View and the Jurisdictional View. The combined view holds that the Commission should not pay double, but that it is legally constrained from acknowledging the retail energy rate. Given that constraint, the best it can do is pay LMP on top of the retail energy rate. This view is self contradictory—the problem it addresses is a low retail energy rate, yet it is barred from taking notice of that price when it proposes a solution. Also there is no logical connection between lack of jurisdiction over something and a need to assume it does not exist. In any case the Commission has wisely chosen not to explicitly express reliance on any such theory and explicitly rejects the idea that paying LMP – G is optimal and paying LMP is second best. Hence this pair of views cannot form a basis for double payment.

The Balancing View, which the Commission explains and repeatedly advocates, would—if correct— form a sound basis for ignoring G and paying LMP. The two are defined to be payments for entirely unrelated services and both are fully justified in their own right. The problem is that the Balancing View rests on an egregious misunderstanding of markets in general and power markets in particular. It declares that some DR can perform the wholesale service of balancing as well as can supply so it should be paid the same for providing that service. This much is correct.

It further claims that supply is paid the LMP for its balancing services. This is incorrect. Supply is paid nothing for these services, and instead is paid LMP for the energy it supplies regardless of whether it is supplied by nuclear plants which play no active balancing role, or by gas turbines which do play an active role in balancing. Hence, because the mandated payment of LMP is based on the incorrect view that supply is paid for balancing and not for energy, there is no basis for the Commission's mandated payment of LMP. If instead, the payment of supply is acknowledged to be for energy, then the Commission could properly find that that the total reward for DR should be the same as the total reward for supply. But this would require taking into account that DR is already rewarded in the retail market, and that in the California ISO that reward already exceeds the LMP in almost all hours.

11. Summary and Conclusion

Order 745 works hard to ignore the retail market in which demand response is provided. The result is an Order which pays DR providers the wholesale price, LMP, while they also collect approximately the retail energy rate, G. The result is a double payment of LMP+G. This will lead to inefficient DR programs and increased costs for consumers.

Although the Commission may rely in part on jurisdictional issues to avoid taking account of G, this view admits that the problem being fixed is inefficient pricing in the retail market. But if compensating for retail pricing failures is the purpose of the Order it makes no sense to argue that the Commission cannot take account of retail pricing. Apparently because jurisdictional limitations would not provide a sound basis for the Order, the Commission has invented the Balancing View. The Balancing View holds that ISOs and RTOs should pay DR providers for balancing services they provide to the wholesale market since these do not overlap the services for which DR is being paid in the retail market. Hence, under the Balancing View, there is no double payment, and the Commission need not concern itself with payments made in the retail market.

The Order proposes paying DR the LMP primarily for its "balancing service." Since this can be as well provided by DR as by supply, the Commission concludes that DR should be paid the same for this service as supply is paid. The Commission then claims that supply is paid LMP for its balancing services. In fact supply is paid nothing for these services and instead is paid the LMP for the energy it supplies. This error invalidates the basis of the Order.

As noted, the favored Bid-In DR providers receive LMP+G. In the case of behind-the-meter generation, which can easily qualify as Bid-In DR, this payment is clearly preferential and discriminatory, because the identical generation, performing all of the same services, will be paid only LMP if it is classified as supply. It is also discriminatory because a consumer with the same behind-the-meter generation that responded identically to the wholesale price would be paid only G if it does not contract with a DR provider to bid into the wholesale market.

Because of the excess cost of paying LMP+G instead of LMP, ISOs and RTOs will need to charge consumers more through an uplift to the wholesale price. To avoid this problem, the Order notes that the LMP will be depressed by DR and will therefore save all consumers enough to cover the cost of double payments. But this will only work when the LMP is sensitive enough to DR. So a net benefits test is required to determine the Price Threshold below which LMP is too insensitive. Double payment is not allowed at these low prices, but only when reduction of the LMP will cover its cost.

The net benefits test first measures (incorrectly) the cost of overpayment, which would not be cost effective were it not for the depressing effect it has on the market price. This is an admission that DR payments are expected to exercise market power. But, because of errors in the test, this admission will at times be erroneous. However, when the LMP is below the retail energy rate, Order 745 does require the exercise of monopsony power—incurring a cost that only becomes a net benefit by suppressing the market price. This is not the intent of Order 745 but it is the inevitable outcome of double payment, when the retail energy rate is already higher than the LMP (and also for somewhat higher values of LMP).

The miscalculation of the cost of overpayment, upon which the net benefits test is based, should be remedied immediately, for it is a simple accounting error. The cost to utility customers is not the LMP times the demand reduction as claimed in the Order. Instead, it is the retail energy rate, G, times the demand reduction.

The Commission should abandon its Balancing View of the LMP and, with it, abandon its aversion to taking into account the retail payments for energy saved. After all, saving energy costs is the entire point of the DR product considered by Order 745. The idea that demand response should be paid for bidding instead of for saving energy is a fiction that will cause endless regulatory errors and complications once accepted.

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Washington, D.C., this 17th day of June, 2011.

/s/ Bradley R. Miliauskas
Bradley R. Miliauskas