

Nos. 14-840 and 14-841

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IN THE

**Supreme Court of the United States**

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Federal Energy Regulatory Commission,  
*Petitioner,*

*v.*

Electric Power Supply Association, *et al.*,  
*Respondents.*

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EnerNOC, Inc., *et al.*,  
*Petitioners,*

*v.*

Electric Power Supply Association, *et al.*,  
*Respondents.*

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On Writ of Certiorari to the United States Court  
of Appeals for the District of Columbia Circuit

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**BRIEF OF STANFORD ECONOMICS  
PROFESSOR CHARLES D. KOLSTAD AS  
AMICUS CURIAE IN SUPPORT OF  
PETITIONERS**

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**INTEREST OF *AMICUS CURIAE*<sup>1</sup>**

Professor Charles D. Kolstad of Stanford University is an internationally known environmental economist with a focus on industrial organization, public economics, and energy markets. He is a former president of the Association of Environmental and Resource Economists (AERE). Prior to joining Stanford in 2012, he was on the faculty of the University of California, Santa Barbara, where he was Chair of the Department of Economics and a Bren Distinguished Professor of Environmental Management. Professor Kolstad is also a University Fellow at Resources for the Future (Washington, DC), a Fellow of CESifo (Munich, Germany) and a Research Associate at the National Bureau of Economic Research (Cambridge, MA).

As an academic economist concerned with the design of energy markets, Professor Kolstad has an interest in the use of economic analysis in FERC's Order 745 and in the subsequent judicial review of that order. Accordingly, this brief addresses only the second of the two questions presented to this Court: whether the Court of Appeals erred in holding that the rule issued by the Federal Energy Regulatory Commission is arbitrary and capricious.

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<sup>1</sup> All parties have consented to the filing of this brief and copies of their consent letters have been filed with the Clerk. Pursuant to Rule 37.6, counsel certifies that this brief was not authored in whole or in part by counsel for any party, and that no person other than *amicus* or his counsel made a monetary contribution to its preparation or submission.

## SUMMARY OF ARGUMENT

Properly enabling demand response resources to compete with electricity generators in wholesale markets benefits all consumers. It also requires economically complex market design choices.

In developing Order 745, entitled Demand Response Compensation in Wholesale Energy Markets, the Federal Energy Regulatory Commission (FERC) invited and received comments from leading energy economists regarding the appropriate compensation level for demand response resources. Although the experts did not agree, FERC explicitly addressed the conflicting comments it received and made a carefully reasoned choice: Order 745 requires wholesale markets to pay demand response resources using locational marginal prices (LMP), rather than LMP minus the retail price of electricity (LMP-G) or some other measure.

Acknowledging the conflicting testimony it received on this question, FERC included a net benefits test that makes Order 745's compensation level (LMP) conditional on delivering net benefits to consumers. This test helps mitigate concerns that LMP overcompensates demand response resources by ensuring that Order 745's application results in net benefits to consumers as a class.

The administrative record confirms that FERC thoroughly reviewed conflicting expert opinions in a highly technical regulatory process, provided a detailed and logical rationale for adopting one compensation level rather than another, and added a precautionary net benefits test to ensure consumer benefits in light of conflicting expert opinion. In short,

Order 745 is well reasoned and neither arbitrary nor capricious.

## ARGUMENT

### I. Encouraging Demand Response in Wholesale Electricity Markets Benefits All Consumers

On a muggy August afternoon in Washington, D.C., people across the nation's capital turn up their air conditioning systems to escape the sweltering heat. Demand for electricity skyrockets. Wholesale electricity market operators—who have the task of balancing supply and demand in real-time, literally at the speed of light—respond by calling on additional suppliers to generate sufficient energy to meet demand. Because market operators dispatch electricity resources based on their relative costs, with the lowest-cost resources dispatched first, wholesale electricity prices can rise quickly as demand for electricity increases.

During the worst summer heat, all available low-cost power plants are already running at full output, requiring market operators to call on the most inefficient and expensive generation resources to match rising demand. These so-called *peaker plants* sit idle for much of the year and are activated only in moments of peak electricity demand. They require more fuel (and often generate more pollution) per unit of electric output than do power plants engineered to operate on a more frequent basis, leading to higher operating costs. In turn, market operators rarely call on them, so their owners must recoup the entire capital cost of their investment through high-priced sales made in a handful of hours, during a few days

each year. As a result, peaker plants are the most expensive suppliers of electricity.

In a wholesale market without demand response resources, market operators have no choice but to call on expensive peaker plants to meet peak demand. This raises prices for all consumers because of the way wholesale electricity markets work. All generators, including peaker plants, submit bids to the market operator that reflect the lowest price they would be willing to accept to generate energy; peakers submit comparatively high bids that reflect their high operating costs. Critically, *all* dispatched resources are paid the same market-clearing price—known as the *locational marginal price* (LMP), which varies by location according to generation costs and transmission constraints.

Thus, on that hot afternoon in August when peaker plants are needed to meet demand, the wholesale market price spikes to induce peaker plants to operate. The resulting high market price is a boon for more efficient generators, but is costly to electricity consumers.

Enter demand response, which FERC regulations define as a “reduction in the consumption of electric energy by customers from their expected consumption in response to an increase in the price of electric energy or to incentive payments designed to induce lower consumption of electric energy.” 18 C.F.R. § 35.28(b)(4). Similarly, a demand response resource is a “resource capable of providing demand response.” *Id.* at § 35.28(b)(5).

Rather than dispatching expensive peaker plants to generate more electricity, market operators can

call on demand response resources to reduce system-wide consumption. If demand response resources are willing to accept a lower price than peaker plants, the resulting market price will be lower than in a market without demand response, thereby saving consumers money.

Under ideal market conditions, economic theory states that a consumer's voluntary choice to buy a product indicates he is willing to pay at least as much as the price he paid. But wholesale electricity markets are far from perfect. Many wholesale market customers, such as electric utilities, pass their full costs on to their ultimate customers via average, time-invariant prices; this pricing regime reduces the potential for consumers to rationally respond to the real-time prices available in wholesale electricity markets. As FERC noted in Order 745, "demand responsiveness to price changes is relatively inelastic<sup>2</sup> in the electric industry and does not play as significant a role in setting the wholesale energy market price as in other industries." Pet. App. 96a (¶ 57). Thus, FERC chose to encourage a more dynamic response from wholesale electricity market consumers and, in turn, to achieve a more economically efficient outcome.

If permitted, demand response resources can bid into wholesale markets in one of two ways. First, some large firms that consume significant quantities of electricity are able to reduce demand at a scale big enough to sell directly into the wholesale market. Consider a large commercial retailer that has in-

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<sup>2</sup> Demand for a certain product is said to be "inelastic" if a change in price leads to little or no change in demand.



store refrigerated storage for food and other perishables. The retailer could anticipate sweltering temperatures and pre-cool its well-insulated refrigeration systems before power prices spike in the afternoon heat, allowing the company to reduce its power demand when air conditioning at homes and offices is needed most.

Second, although many firms (and most residential consumers) are too small to generate significant demand response resources on their own, they can participate in wholesale electricity markets via a *demand response aggregator*—a third party that aggregates individual customers' savings and bids them as a block into the wholesale market. With a proper market design in place, demand response aggregators can develop innovative business models to coordinate such demand response resources using internet-enabled appliance controls and other advanced technologies. For example, a demand response aggregator could conceivably pre-cool the refrigerators of many willing individual homeowners, delivering a significant demand response resource by coordinating many smaller actions.

Allowing demand response resources to compete with generators in wholesale electricity markets can help correct for market failures present in today's electricity system, reduce peak prices, and enable a more economically efficient overall outcome. These are the fundamental goals of Order 745, which establishes a standard market design that opens all organized wholesale electricity markets to competition from qualified demand response resources. *Id.* at 54a-55a (¶ 2). Notably, dissenting FERC Commissioner Moeller himself acknowledged the benefits of

a well-designed demand response policy in wholesale electricity markets:

While the merits of various methods for compensating demand response were discussed at length in the course of this rulemaking, nowhere did I review any comment or hear any testimony that questioned the benefit of having demand response resources participate in the organized wholesale electricity markets. On this point, there is no debate.

*Id.* at 156a.

Thus, when reviewing the technically complex features of Order 745's market design—and in particular, the compensation level awarded to demand response resources—the Court should be mindful that FERC's overarching goal of encouraging additional demand response activity in wholesale markets met with remarkably broad support in the administrative record. Leading experts (and FERC Commissioners) differ only as to how best to implement that goal.

## **II. FERC Received Conflicting Comments from Leading Economists Regarding the Appropriate Demand Response Resource Compensation Level and Made a Carefully Reasoned Choice**

Order 745 requires wholesale electricity market operators<sup>3</sup> to compensate qualified demand response resources that successfully bid into the market at the standard wholesale market price. 18 C.F.R.

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<sup>3</sup> These entities are known as Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs).

§ 35.28(g)(1)(v). In industry parlance and throughout the record, this price is called LMP, a technical term that refers to the time-variant, location-specific prices found in wholesale auction markets regulated by FERC.<sup>4</sup>

The D.C. Circuit vacated Order 745 chiefly because it found that FERC lacks jurisdiction to regulate demand response in wholesale electricity markets and, in the alternative, because the Order was arbitrary and capricious for failing to provide a “direct response” to questions raised by dissenting Commissioner Moeller. Pet. App. 16a (citing *Am. Gas Ass’n v. FERC*, 593 F.3d 14, 20 (D.C. Cir. 2010)). Specifically, the lower court criticized FERC for not addressing the argument that LMP “‘overcompensat[es]’ demand response resources.” *Id.* at 15a (quoting *id.* at 273a). Finding that an overcompensating rate can never be “just and reasonable” as required under the Federal Power Act, 16 U.S.C. § 824d(a), the D.C. Circuit indicated that if it needed to reach the question, it would find Order 745 arbitrary and capricious under the Administrative Procedure Act. Pet. App. 15a-17a (citing 5 U.S.C. § 706(2)(A)).

On this point, the lower court erred. In its final order, FERC did directly address Commissioner Moeller’s concerns in the course of analyzing both sides of an expert debate over the appropriate compensation level for demand response resources. The

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<sup>4</sup> Wholesale auction markets are the markets run by RTOs and ISOs under FERC’s supervision. FERC also regulates bilateral wholesale transactions, which operate under different pricing arrangements. Order 745 does not apply to these bilateral transactions.

Commission explicitly responded to comments that it should adopt alternative compensation levels, including the one Commissioner Moeller preferred, and based its final selection of LMP as “just and reasonable” on evidence in the record submitted by credible experts.

### **A. FERC Received Conflicting Comments from Leading Economists Regarding the Appropriate Compensation Level**

Although FERC received over 3,800 pages of comments and hosted a technical conference on its proposed regulation, the D.C. Circuit undertook only a cursory, two-paragraph analysis of the administrative record. Compare Pet. App. 53a-54a (¶ 1) with *Id.* at 15a-16a. A thorough review of the final rulemaking reveals the very elements the D.C. Circuit thought to be missing. Specifically, the Commission prepared a lengthy summary of the major issues, including significant deliberation over the appropriate compensation level to award demand response resources and how to ensure that the outcome benefits consumers. *Id.* at 67a-119a (¶¶ 18-85).

The heart of the debate concerns the compensation level Order 745 sets for qualified demand response resources. On this question the Commission received and considered conflicting testimony about demand response compensation from multiple parties, including two of the world’s leading authorities on regulatory economics—Professors Alfred E. Kahn and William W. Hogan.

Dr. William W. Hogan, the Raymond Plank Professor of Global Energy Policy and Director of the Electricity Policy Research Group at the John F.

Kennedy School of Government at Harvard University, submitted comments on behalf of respondent Electric Power Supply Association.

Dr. Hogan’s primary concerns with Order 745’s compensation level reflect the complex relationship between wholesale and retail electricity markets. A consumer who curtails her consumption benefits by avoiding payment of the retail price of electricity (G). Under Order 745, the consumer—or the demand response aggregator with whom she is under contract—also receives the wholesale market price (LMP) for providing a demand response resource, resulting in a total compensation of LMP+G. Dr. Hogan refers to this outcome as “double-payment.” *Id.* at 73a-74a (¶ 24). Because this price level would encourage a consumer to avoid consumption that she values at more than LMP but less than LMP+G, it could cause the inefficient curtailment of economically beneficial electricity consumption. *Id.* Accordingly, Dr. Hogan expressed his preference for establishing alternative compensation levels. For example, he suggested FERC could set compensation at LMP–G, a level that would ensure that the wholesale price for demand response (LMP–G) plus the avoided retail costs (G) would equal the marginal wholesale price (LMP) awarded to generators. *Id.* at 76a (¶ 27). Commissioner Moeller cites these same concerns in his dissent, expressing a strong preference for compensating demand response resources at LMP–G rather than LMP. *Id.* at 163a (citing Dr. Hogan’s “double-payment” critique as evidence of overcompensation and therefore a failure to establish “just and reasonable” rates under the Federal Power Act); *id.* at 172a (expressing a preference for LMP–G).

Taking the opposite position, the late Dr. Alfred E. Kahn, formerly the Robert Julius Thorne Professor Emeritus of Political Economy at Cornell University, commented on behalf of demand response providers in support of LMP compensation.

The fundamental premise of Dr. Kahn's argument is that when balancing supply and demand in a wholesale electricity market, increasing supply by generating one additional megawatt-hour is no different than reducing demand by the same amount. Viewing demand-side resources as economically equivalent to supply-side resources, Dr. Kahn argued that both demand response providers and power plant generators should receive equal compensation at LMP. *Id.* at 69a-70a (¶ 20).

Dr. Kahn also addressed Dr. Hogan's concerns about "double-counting" consumer benefits under LMP compensation, pointing out that a similar phenomenon affects producers. He agreed that although consumers avoid the cost of retail power (G), producers also save money since they no longer face the cost of generating the electricity consumption avoided through demand response. *Id.* at 78a (¶ 31). Furthermore, Dr. Kahn disputed the argument that generators are "incomparably saddled" with the costs of generating power under FERC's formulation, as the D.C. Circuit later concluded. *Id.* at 16a. While generators who receive LMP compensation face costs related to generating power—such as purchasing fuel and paying for the capital costs of their power plants—so too do demand response aggregators, who expend labor and capital costs developing sophisticated business models and deploying advanced technologies to deliver demand response resources. *Id.* at

78a (¶ 31) (“successful bidders for the opportunity to induce [demand response] are compensated for the cost of those efforts”). Like supply side resources, demand response resources incur costs.

**B. FERC’s Decision to Adopt LMP  
Compensation for Demand Response  
Resources is Carefully Reasoned and  
Rational**

As evidenced by the debate between these two world-class experts, FERC received conflicting testimony on the best mechanism for compensating demand response resources in wholesale markets. Indeed, this was the first observation FERC made in its final determination. *Id.* at 89a (¶ 45) (“The Commission acknowledges the diverging opinions of commenters regarding the appropriate level of compensation for demand response resources”). After reviewing the issues raised by Dr. Kahn, Dr. Hogan, and other commenters, the Commission then offered three valid reasons for selecting LMP instead of LMP-G.<sup>5</sup>

First, FERC concluded that paying demand response resources LMP “will compensate those resources in a manner that reflects the marginal value of the resource to each [wholesale market operator].” *Id.* The Commission also cited Dr. Kahn’s argument that LMP compensates demand response resources “on a competitive par” with generators. *Id.* at 101a (¶ 61). Under this view, LMP provides equal treatment to demand response resources and traditional

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<sup>5</sup> The Commission’s determination discussed a number of other technical issues in Order 745, which are omitted here for brevity. See Pet. App. 89a-104a (¶¶ 45-67).

generation resources. Just as it would be wrong for FERC to provide one level of compensation to natural-gas-fired power plants and another to coal-fired generators, the Commission reasoned that would it be equally wrong to compensate supply- and demand-side resources at different levels. *Id.* at 101a-102a (¶ 62) (citing FERC’s existing policy of awarding LMP to all generators whose bids clear the market, regardless of technology or fuel source).

Second, FERC identified the presence of market barriers that reduce the contribution of demand response below its theoretical economic potential—notably, the inability of many wholesale market consumers to pass real-time costs on to retail consumers. *Id.* at 96a-99a (¶¶ 57-59) (discussing market barriers in detail). FERC concluded that compensating demand response resources at LMP “can address the identified barriers to potential demand response providers.” *Id.* at 99a (¶ 58). In turn, “[r]emoving barriers to demand response will lead to increased ... participation of demand response resources” and achieve wholesale market prices that are “closer to the levels that would result if all demand could respond to the marginal cost of energy.” *Id.* at 99a (¶ 59).

Third, FERC concluded that Order 745 ensures more consumer benefits than costs by conditioning payment of LMP to demand response resources on a net benefits test. *Id.* at 90a-91a (¶ 47). Section III of this brief, below, describes the test and its effects in detail; as designed, the test guarantees that consumers derive an overall benefit from compensating demand response resources at LMP.



Ultimately, FERC’s decision to compensate demand response resources at LMP levels is a carefully reasoned decision, not an arbitrary and capricious one. As the discussion above indicates, if one is willing to “delve ... into the dispute among experts,” a review of the record in FERC’s Order 745 provides a “direct response” to Commissioner Moeller’s concerns. *Id.* at 16a (citations omitted). Indeed, as Judge Edwards pointed out in his dissent below, “[w]hatever policy disagreements one might have with Order 745’s decision to compensate demand response resources at the LMP (and there are legitimate disagreements to be had), the rule does not fail for want of reasoned decisionmaking.” *Id.* at 47a (Edwards, J., *dissenting*).

Given the divide in the record over the correct compensation level for demand response in wholesale markets, FERC had reasonable grounds to require either LMP or LMP–G, or to explore other compensation arrangements. The Commission’s selection of LMP is based on a careful review of the arguments for and against this level and reflects a logically valid view of the likely impacts of Order 745 on wholesale electricity markets. Consistent with Judge Edwards’s view, one need not agree with FERC’s decision to find it well reasoned. Had FERC selected LMP–G, as respondent Electric Power Supply Association and dissenting Commissioner Moeller would have preferred, one could imagine an equally vigorous dissent from another Commissioner highlighting the benefits of full LMP. See *id.* at 73a (¶ 24, n.57) (citing Electric Power Supply Association’s comment supporting LMP–G); *id.* at 172a (indicating dissenting Commissioner Moeller’s preference for LMP–G over LMP).

Order 745 raised technically complex issues, included extensive deliberation over the appropriate compensation level for demand response resources, and offered a carefully articulated set of reasons to support FERC's decision. It therefore exemplifies exactly the kind of detailed energy market design decisions that should be made by the Commission, not the courts.

### **III. FERC's Net Benefits Test Reflects the Debate about LMP Compensation and Ensures That Consumers Benefit from Demand Response Resources Paid at LMP**

Recognizing divergent points of view among commenters on the appropriate compensation level for demand response resources, FERC conditioned payment of LMP to demand response resources on satisfaction of a "net benefits test" submitted by each wholesale electricity market operator and approved by the Commission. 18 C.F.R. § 35.28(g)(1)(v)(A). Under the test, Order 745 requires that demand response resources receive LMP only when the market-clearing price is sufficiently high to ensure that payments for demand response resources are smaller than the corresponding reduction in consumer expenditures. Pet. App. 114a-115a (¶ 79).

Although at first glance the net benefits test might seem complicated, it is actually quite simple. Demand response lowers the demand for electricity from a relatively high amount ( $Q^H$ ) to a relatively lower amount ( $Q^{DR}$ ), with a net reduction in consumption ( $\Delta Q = Q^H - Q^{DR}$ ). Due to lower demand, the market-clearing price falls from a relatively higher price ( $LMP^H$ ) to a relatively lower price ( $LMP^{DR}$ ), with a net reduction in price ( $\Delta LMP =$

$LMP^H - LMP^{DR}$ ). But demand response resources must be paid, too. Order 745 requires that wholesale market consumers compensate demand response resources at the market-clearing price. 18 C.F.R. § 35.28(g)(1)(v)(B). As a result, demand response resources cost consumers  $LMP^{DR} \times \Delta Q$  but save consumers  $\Delta LMP \times Q^{DR}$ .

FERC's net benefits test requires that the total reduction in consumer expenditures exceeds the total cost of compensating demand response resources:

$$\Delta LMP \times Q^{DR} > LMP^{DR} \times \Delta Q$$

See Pet. App. 115, n.162. In turn, FERC's methodology requires each wholesale market operator to identify the threshold market-clearing price above which this inequality holds true, based on the specific conditions of each market. *Id.* at 114a-117a (¶¶ 79-81). Conversely, when market-clearing prices are below the threshold price identified by the net benefits test, Order 745's requirement to compensate demand response resources at LMP does not apply. 18 C.F.R. § 35.28(g)(1)(v)(A). When demand response passes the net benefits test, demand response resources are compensated at LMP and reduce wholesale market prices. Consumers benefit from reduced expenditures, resulting in an increase in their overall economic welfare.

As with the choice of compensation level, there is also some debate in the record over FERC's use of the net benefits test. This debate is best understood in the light of the conflicting viewpoints articulated by Dr. Kahn and Dr. Hogan. By choosing LMP compensation, FERC aligned itself with Dr. Kahn for the reasons discussed above. But others, including Dr.

Hogan, argued that LMP–G is the economically optimal price signal and therefore compensation at LMP would be economically inefficient. As FERC acknowledged, those who prefer LMP–G argue that under their approach there would be no need for a net benefits test because LMP–G would send the economically optimal price signal to market participants without additional policy safeguards. Pet. App. 117a (¶ 82). Having established its rationale for awarding full LMP compensation, however, FERC noted that it saw “no reason to reduce that compensation simply to avoid the use of the net benefits test.” *Id.*

A net benefits test is a sensible way of dealing with the conflicting testimony the Commission received over the proper compensation level for demand response resources. Notably, combining a net benefits test with LMP compensation addresses and mitigates FERC’s critics’ most pressing concerns. In short, the net benefits test is designed to ensure that consumers are made better off under Order 745.

It is worth noting that although FERC refers to its approach as a “net benefits test,” it would be more accurate to describe it as a “static consumer expenditure test.” This is because the test focuses exclusively on consumers’ *expenditures*—in economic terms, a sufficient condition to ensure that consumers’ *welfare* is enhanced, but an incomplete picture of how the welfare of all market participants, including producers, is affected. The test is static, as opposed to a dynamic, in that the test methodology is based on historical market conditions. See *id.* at 116a–117a (¶ 81). Recognizing the limitations of a static analysis, FERC wisely required wholesale market opera-

tors to study implementation of dynamic methods to integrate demand response resources into the markets' electricity dispatch algorithms. *Id.* at 118a-119a (¶ 84). While a static expenditure-based test cannot guarantee that compensating demand response resources at LMP optimizes overall social welfare, it safeguards against the possibility of overcompensating demand response resources to the detriment of consumers as a group.

The net benefits test is designed to guarantee lower market prices, resulting in benefits to consumer welfare. Producers receive less income due to lower market prices, reducing their welfare. Demand response aggregators' welfare increases, however, due to compensation at LMP under Order 745. Without additional information about market conditions, the expenditure analysis in FERC's net benefits test cannot tell us whether the gains in consumer and demand response aggregators' welfare are greater than or less than the loss in producer welfare; however, we can be confident that this approach will increase consumer welfare, so long as it is properly executed by wholesale market operators.

Because the net benefits test is designed to ensure that consumers save more money from lower wholesale market prices than they pay to compensate demand response resources and because the Commission relied on this finding, FERC's decision to compensate demand response resources with LMP is rational and carefully reasoned.

**CONCLUSION**

For the foregoing reasons, the judgment of the court of appeals should be reversed.

Respectfully submitted,

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