

**STATE OF ILLINOIS**  
**ILLINOIS COMMERCE COMMISSION**

COMMONWEALTH EDISON COMPANY :  
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 :  
Petition to approve an Advanced Metering : No. 09-0263  
Infrastructure Pilot Program and associated tariffs :

Rebuttal Testimony of  
**AHMAD FARUQUI, PH.D.**  
Principal,  
The Brattle Group

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1 **I. Introduction & Summary**

2 **Q. Please state your name and business address.**

3 A. My name is Ahmad Faruqui. My business address is 353 Sacramento Street, Suite 1140,  
4 San Francisco, California.

5 **Q. By whom and in what position are you employed?**

6 A. I am a Principal with The Brattle Group.

7 **Q. On whose behalf are you testifying in this proceeding?**

8 A. I am testifying on behalf of Commonwealth Edison Company (“ComEd”).

9 **Q. Please state your qualifications.**

10 A. I have a doctoral degree in economics from the University of California at Davis and  
11 have authored, co-authored or co-edited four books and more than one hundred articles,  
12 papers and reports on various aspects of energy policy. A major focus of my work during  
13 the past thirty years has been the design and evaluation of pricing experiments. My early  
14 work on time-of-use pricing is cited in Professor Bombright’s text on public utility  
15 regulation<sup>1</sup>.

16 I was one of the lead designers and evaluators of California’s Statewide Pricing  
17 Pilot with time-based pricing. I was also the lead investigator in BGE’s dynamic pricing  
18 experiment which ran during the summer of 2008 and is being renewed this summer.  
19 And I am the lead designer and evaluator of Northeast Utilities’ time-based pricing  
20 experiment which is being carried out in Connecticut this summer. In addition, I have

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<sup>1</sup> James C. Bombright, Albert L. Danielsen, David R. Kamerschen, Principles of Public Utility Rates, Public Utility Reports (2<sup>d</sup> ed., 1988).

21 been tracking pilots that have been conducted elsewhere in the United States, Canada,  
22 Europe and Australia. Several of these are summarized in a paper referenced in footnote  
23 5 below.

24 Additional information about my qualifications appears in my resume which is  
25 appended to this testimony.

26 **Q. What has been your involvement with the ComEd Customer Applications proposal**  
27 **being considered by the Commission in this docket?**

28 A. I had a significant role in preparing the Evaluation Plan associated with the Customer  
29 Applications pilot submitted by ComEd.

30 **Q. Please state the purpose of your testimony.**

31 A. The purpose of my testimony is to respond to certain issues that have been raised by AG-  
32 AARP witnesses Ms. Barbara Alexander and Staff witness Dr. David Brightwell  
33 concerning the Customer Applications portion of ComEd's AMI pilot.

34 **Q. What is the main purpose of ComEd's proposed Customer Applications Pilot?**

35 A. The main purpose is to provide insights into customer behavior associated with utility  
36 demand response and energy efficiency programs. These insights can be used by ComEd  
37 to inform the cost-benefit analysis of new technologies such as advanced metering  
38 infrastructure (AMI), web-based informational feedback, in-home display devices,  
39 programmable communicating thermostats, and new rate designs such as dynamic pricing  
40 and inclining (sometimes also called increasing) block rates.

41 Well designed customer application pilots can yield valuable information should  
42 be considered with other information when looking at whether or not to deploy AMI and  
43 associated technologies and rate designs.

44 **II. Response to Witness Alexander**

45 **Q. Witness Barbara Alexander contends that the ComEd experiment will duplicate the**  
46 **pilot programs conducted in other states.<sup>2</sup> Does Witness Alexander's testimony**  
47 **present a fair and complete summary of the information that has already developed**  
48 **and the studies that have already been done?**

49 A. No. She merely states her opinion. Despite decades of experimentation, a great deal of  
50 new work needs to be done in the area since new rates and technologies continue to  
51 evolve and so does customer behavior. I say that as someone who has been involved in  
52 all facets of pilot design during the past three decades and one who has read just about  
53 everything that has been written about time-based pricing experiments. ComEd is not  
54 proposing to repeat pricing options that have already been explored but to focus on new  
55 ones.

56 **Q. Do you and Witness Alexander approach the question of evaluating past experience**  
57 **and future study design from the same background?**

58 A. No. We have very different qualifications and experiences. My degrees are in  
59 economics with a heavy emphasis on econometrics and quantitative methods. I have  
60 three decades of experience in designing and evaluating pricing experiments. Her  
61 degrees are in political science and law. As best as I can determine, she has not had an

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<sup>2</sup> Alexander, lines 507-8, page 25.

62 opportunity to study the economics of dynamic pricing in detail and to have first-hand  
63 experience in designing and evaluating pricing experiments to the same extent as I have.

64 **Q. Is Witness Alexander correct in saying that it is unnecessary for ComEd to conduct**  
65 **its own dynamic pricing pilot as outlined in ComEd’s application?**

66 **A.** No. She is not correct. It would not be possible for ComEd or the Commission to arrive  
67 at a definitive conclusion about the costs and benefits of a full scale AMI and customer  
68 application deployment in the absence of this pilot. That is in part because of the factors  
69 unique to ComEd and its service territory. Every utility service area has unique  
70 conditions that impede the en masse importation of results from other service areas,  
71 especially if they are far removed geographically. Factors that vary across service areas  
72 include the socio-demographic characteristics of customers, economic conditions, past  
73 and current rate history and climate. Each of these factors can make a significant  
74 difference in the amount of demand response one is likely to observe at different price  
75 points in a specific service area.<sup>3</sup>

76 My conclusion is also based on my understanding of the limitations of the pilots  
77 completed to date and the uniquely desirable characteristics of the proposed ComEd  
78 investigation. I am very familiar with the pilot programs conducted in other jurisdictions.  
79 ComEd’s pilot will answer several questions that remain unresolved based on prior work.  
80 For example, what is the impact of inclining block rates on energy efficiency? What is  
81 the impact of different ways of providing feedback to customers on the cost of using

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<sup>3</sup> For a summary of the experimental evidence, consult Ahmad Faruqui and Sanem Sergici, “Household Response to Dynamic Pricing of Electricity –A Survey of the Experimental Evidence,” January 10, 2009. <http://www.hks.harvard.edu/hepg/>

82 energy at various times? How do these various treatments interact with each other? How  
83 do they interact with dynamic pricing? How do critical peak pricing and peak time  
84 rebates work when they are overlaid on a real time pricing rate? There is little prior  
85 evidence with which to answer these important policy questions.

86 For all these reasons, I believe that it is imperative that the Commission approve  
87 ComEd's proposed study.

88 **Q. Witness Alexander says that California's statewide pricing pilot included peak  
89 time rebates.<sup>4</sup> Is she correct?**

90 **A.** No. I was a principle designer of that pilot and have intimate and first hand knowledge  
91 of what was studied in it. I spent three years designing and evaluating it and presenting,  
92 interpreting and defending the results to a large working group drawn from all facets of  
93 the industry. The California experiment she cites did not in fact include peak time  
94 rebates and therefore provided no direct evidence on their impact. Peak time rebates  
95 were tested for the first time in a small pilot carried out by the City of Anaheim in  
96 California. Versions of peak-time rebate have also been subsequently tested in Ottawa,  
97 Canada; Baltimore, Maryland; and Washington, D.C., although under different conditions  
98 than ComEd proposes. Imprecise results were obtained from the Ottawa experiment and  
99 the Washington, DC pilot has not yet published its results. The small number of studies  
100 and their limitations reinforce my recommendation that that it would be beneficial for  
101 ComEd to do its own study.

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<sup>4</sup> Alexander, line 552, page 27.

102 Q. **Witness Alexander asserts that ComEd should not test critical-peak pricing rates in**  
103 **the experiment because they are “potentially dangerous” and “will make essential**  
104 **electricity service more volatile and less stable for the average customer.”<sup>5</sup> Is that**  
105 **assertion accurate or supported?**

106 A. No. California’s experiment did not produce any backlash on critical-peak pricing nor  
107 did Maryland’s experiment. Witness Alexander assumes that critical-peak pricing rates  
108 are inherently un-attractive to customers but provides no proof to support her contention.  
109 The very opposite may well be true. Because they offer lower off-prices than peak-time  
110 rebates, critical-peak pricing rates can be designed to yield higher savings on a per-  
111 customer basis. And if they are coupled with a guarantee that the customer will pay a bill  
112 no higher than what they would have paid on standard rates, they can be made as risk-  
113 free as peak time rebates. Various other methods of making a transition to dynamic  
114 pricing are discussed in an article I wrote for the Public Utilities Fortnightly.<sup>6</sup> The  
115 Commission – and other stakeholders and regulators – should consider the relative  
116 desirability of offering critical peak pricing or peak time rebates based on results from  
117 ComEd’s proposed pilot. Conjecture and speculation, however artfully worded, are a  
118 dangerous basis for policy making. The allegation that critical peak pricing rates are  
119 “dangerous” is therefore not only misplaced but is likely to impede progress toward  
120 reforming rate design in Illinois.

121 Q. **What data does Ms. Alexander point to support her position?**

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<sup>5</sup> Alexander, lines 667-8, page 34.

<sup>6</sup> Ahmad Faruqui and Ryan Hledik, “Transitioning to Dynamic Pricing,” *The Public Utilities Fortnightly*, March 2009.



122 A. Rather than provide any evidence of “danger” or undesirable volatility, she simply cites  
123 the BGE Smart Energy Pilot to argue that since critical-peak pricing rates and peak-time  
124 rebates provide similar responses on a per-customer basis, there is no need to test both of  
125 them in the ComEd pilot. She further argues that peak time rebates are the superior rate  
126 design since they are likely to yield greater amounts of aggregate demand response since  
127 more customers are likely to take part in them.

128 **Q. Are these claims reasons to reject or modify ComEd’s proposal?**

129 A. No. While it is true in the BGE pilot critical-peak pricing rates and peak-time rebates  
130 were found to have the same degree of price responsiveness (as measured by their  
131 underlying price elasticities), this conclusion has not been uniformly established across a  
132 wide range of pilot programs. Results are still pending from the PowerCents DC pilot  
133 that was carried out last summer in the District of Columbia. Moreover, because of  
134 differences in rate and study design, it is a bit premature to conclude definitively that  
135 peak time rebates and critical peak pricing would produce the same comparable response  
136 in northern Illinois as they did in Maryland.

137 **Q. Witness Alexander argues that ComEd should focus the pilot on higher usage**  
138 **residential customers. She asserts that 65.5% of the customers without electric heat**  
139 **use less than 700 kWh a month and they are not in a position to reduce or shift**  
140 **usage.<sup>7</sup> Is she correct?**

141 A. No. In California, the average customer who uses less than 700 kWh a month reduced  
142 his or her peak demand on critical days by 13.1 percent. Customers who used half as

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<sup>7</sup> Alexander, 643-652, page 33.

143 much energy as the average customer displayed a drop in demand of 12.2 percent and  
144 those who used twice as much energy as the average customer displayed a drop in  
145 demand of 14.7 percent.<sup>8</sup> It is important for ComEd to study how customer response  
146 varies by customer size in its service area. The response of smaller users should not be  
147 predetermined to be zero. It should be the object of experimental inquiry.

148 **Q. Witness Alexander concludes that “the Commission order ComEd not to subsidize**  
149 **the costs of providing a variety of in-home display devices to participating**  
150 **customers, but instead allow ComEd to offer customers a variety of device and**  
151 **functional options from manufacturers who might therefore be willing to provide a**  
152 **reduced price on the equipment for this pilot program.” Do you agree with her**  
153 **conclusion?**

154 **A.** No, it is not practical to adopt her approach in a pilot setting. It would create  
155 unacceptable risks since no customers may chose to buy those technologies if the burden  
156 of purchase is put on them. The effects of these technologies on electricity consumption  
157 would then remain unmeasured, severely undermining the value of information coming  
158 out of the pilot.

159 **III. Response to Witness Dr. Brightwell.**

160 **Q. Witness Brightwell states that “other pilots did not use AMI meters and two-way**  
161 **communications to inform customers about usage” and suggests this is one of the**  
162 **new features of the ComEd pilot.<sup>9</sup> Do you agree?**

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<sup>8</sup> Ahmad Faruqui and Stephen S. George, “Quantifying Customer Response to Dynamic Pricing,” *The Electricity Journal*, May 2005.

<sup>9</sup> Brightwell, lines 96-97, page 5.

163 A. Yes, that is one of the many unique features of this pilot which make it worth doing.  
164 While other pilots have tested the impact of in-home displays,<sup>10</sup> they have not tested the  
165 combined effect of in-home displays (and other informational treatments) with innovative  
166 rate designs in a manner that the ComEd pilot sets out to do.

167 Q. **Witness Dr. Brightwell recommends that the Commission not approve including**  
168 **inclining block rates in the study.<sup>11</sup> Do you agree with that conclusion?**

169 A. No, I don't. The impact of inclining block rates on energy efficiency is an under-  
170 researched topic. Two-thirds of the residential customers in the United States buy their  
171 power on declining block rates or flat rates. At the same time, utilities and states are  
172 ramping up their rebate-based energy efficiency programs. This is equivalent to pressing  
173 the gas pedal and the brake at the same time while driving a car. Inclining block rates  
174 can play a significant role in enhancing energy efficiency, possibly at lower cost and with  
175 higher sustainability.<sup>12</sup> They can influence both short term behavior and long term  
176 appliance purchases (by shortening the payback period).

177 However, they need to be studied rigorously because their impact on energy  
178 consumption is somewhat uncertain and their impact on peak demand is virtually  
179 unknown. While there is a large body of knowledge on how customers respond to  
180 general price increases, there is hardly any information on price elasticities by tier and on  
181 the impact of moving from flat or declining block rates to inclining block rates. It is

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<sup>10</sup> Results from a dozen pilots are summarized in Ahmad Faruqui, Sanem Sergici and Ahmed Sharif, "The impact of informational feedback on electricity consumption –A survey of the experimental evidence," *Energy: The International Journal*, Special Issue on Demand Response, 2009, forthcoming.

<sup>11</sup> Brightwell, lines 115-116, page 6.

<sup>12</sup> Ahmad Faruqui, "Inclining toward efficiency," *The Public Utilities Fortnightly*, August 2008.

182 indeed true, as stated by Dr. Ross Hemphill and cited by Dr. Brightwell, that California  
183 has many years of experience with inclining block rates. But there is limited evidence on  
184 the impact of these rates since they were not offered in an experimental setting with  
185 randomly chosen and balanced treatment and control groups. They were born in the  
186 aftermath of the California Energy Crisis, as a legislated means of recovering costs  
187 associated with the crisis.<sup>13</sup>

188 The ComEd design would allow measurement of the response of customers to  
189 inclining block rates coupled with various informational treatments such as web portals  
190 and in-home displays. Some analysts have argued that inclining block rates can be an  
191 effective means of lowering peak demand because they target higher uses which  
192 generally occur during peak hours and are associated with the use of central air  
193 conditioning. The ComEd design would allow for this hypothesis to be tested and for the  
194 impact on peak demand associated with inclining block rates to be compared with the  
195 impact of dynamic pricing rates that specifically target peak demand.

#### 196 **IV. Conclusions**

197 **Q. From the perspective of an expert economist and study designer, is ComEd's**  
198 **experimental design is too large?**

199 **A.** No. I believe the size is consistent with the number of hypotheses it is testing about  
200 customer behavior and I believe each of the hypotheses are valuable and worth testing.  
201 Indeed, one could argue that the proposed design is not large enough. Other pricing  
202 experiments including those in California, Connecticut and Maryland have included two

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<sup>13</sup> Brightwell, lines 179-181, pages 8-9.

203 price levels within the same treatment cell in order to precisely measure customer price  
204 elasticities. A new pilot in Ireland is testing five pricing levels. ComEd has only  
205 included a single price level per cell in order to contain costs.

206 **Q. From the perspective of an expert economist and study designer, is ComEd's**  
207 **experiment unreasonably expensive?**

208 A. No. It is reasonably priced for its size and scope. The experiment has a cost of \$14.8  
209 million and features some 8,000 customers in its various treatment and control groups  
210 and it is testing many more cells than California's Statewide Pricing Pilot which cost \$20  
211 million and featured some 2,500 customers. The California pilot was estimated to yield  
212 information that was more than ten times as valuable as its cost.<sup>14</sup> While it is difficult to  
213 know whether the same ten-fold multiple would hold in ComEd's case, I would also  
214 expect the benefits to significantly outweigh the costs.

215 Q. Does this complete your direct testimony?

216 A. Yes.

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<sup>14</sup> Ahmad Faruqui, Sanem Sergici and Ahmed Sharif, "Piloting the Smart Grid," *The Electricity Journal*, August 2009.

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**VERIFICATION**

I, Ahmad Faruqui, being first duly sworn, states that he is Principal with The Brattle Group and has provided rebuttal testimony, identified as ComEd Ex. 10.0, on behalf of Commonwealth Edison Company (“ComEd”). ComEd Ex. 10.0 was prepared by Mr. Faruqui or under his direction and control. Under penalties as provided by law pursuant to Section 1-109 of the Code of Civil Procedure, the undersigned certifies that the statements set forth in this instrument are true and correct, except as to matters therein stated to be on information and belief and as to such matters the undersigned certifies as aforesaid that he verily believes the same to be true.

  
\_\_\_\_\_  
Ahmad Faruqui