

STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

THE CITIZENS UTILITY BOARD)
and)
THE ENVIRONMENTAL DEFENSE FUND)
) Docket No. 14-____
Petition to Initiate Proceeding to Adopt the)
Illinois Open Data Access Framework)

DIRECT TESTIMONY OF ANDREW BARBEAU
ON BEHALF OF THE CITIZENS UTILITY BOARD AND
THE ENVIRONMENTAL DEFENSE FUND

CUB/EDF Exhibit 1.0

August 15, 2014

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

2 A. My name is Andrew Barbeau and my business address is 18 S. Michigan Avenue,
3 12th Floor, Chicago, IL 60603.

4 **Q. By whom are you employed and in what capacity?**

5 A. I am retained by the Environmental Defense Fund (“EDF”) as a consultant. EDF is
6 a non-profit organization whose mission is to preserve the natural systems on which
7 all life depends. Guided by science and economics, EDF strives to find practical and
8 lasting solutions to the most serious environmental problems. I act as and EDF
9 representative in Illinois and work with Illinois stakeholders such as the Citizens
10 Utility Board (“CUB”) to set specific performance criteria for smart grid deployment
11 and develop regulatory reforms and new electric sector business models to create
12 market opportunities for entrepreneurs with innovative energy technologies and
13 services and transform utilities into agents of change.

14 Since 2012, I have been working with CUB and EDF on how best to maximize
15 the consumer and environmental benefits from the deployment of new energy
16 infrastructure, in this instance the investments that Commonwealth Edison
17 Company (“ComEd”) described in its proposed Smart Grid Advanced Metering
18 Infrastructure Deployment Plan (“AMI Plan”), filed on April 23, 2012 with the
19 Illinois Commerce Commission (“ICC” or “the Commission”). In particular, I have
20 been working with parties on how best to utilize the interval usage data that will be
21 made available by advanced metering infrastructure (“AMI”) deployment to design
22 and promote new opportunities in energy efficiency and demand response.

23 **Q. Please describe your education and relevant work experience.**

24 A. I have Master’s and Bachelor’s degrees from Loyola University Chicago. I have been

25 President of The Accelerate Group, LLC for two years, serving as a consultant to
26 non-profit organizations and entities looking to advance innovative energy projects.
27 I previously served as Managing Director of the Robert W. Galvin Center for
28 Electricity Innovation at Illinois Institute of Technology.

29 **Q. In what capacity are you testifying in this proceeding?**

30 A. I am testifying as a witness for CUB and EDF.
31

32 **Value of Customer Usage Data**

33 **Q. How familiar are you with how Illinois utilities measure customer usage of**
34 **electricity?**

35 A. I'm very familiar. Commonwealth Edison Company ("ComEd") and the Ameren
36 Illinois Company ("Ameren") currently offer most of their customers standard,
37 analog meters which record usage as it occurs. These meters do not provide a daily
38 record of usage, nor do they record when changes in usage occur. They are read
39 monthly using manual meter reads and the customer is billed accordingly for
40 differences in usage in the next billing cycle. Most customers don't know what they
41 used until the utility billing cycle is complete, and though they can access historical
42 monthly usage totals, they don't know how their usage changes from day to day or
43 hour by hour.

44 **Q. What customers have access to more specific usage data?**

45 A. Customers who have a new smart meter, those who are on dynamic rates – such as
46 the real-time pricing programs – or customers who are not residential can have
47 meters which provide hourly usage data which can be viewed, at earliest, the next
48 day through a Web portal.

49 **Q. What value is there in customer usage data?**

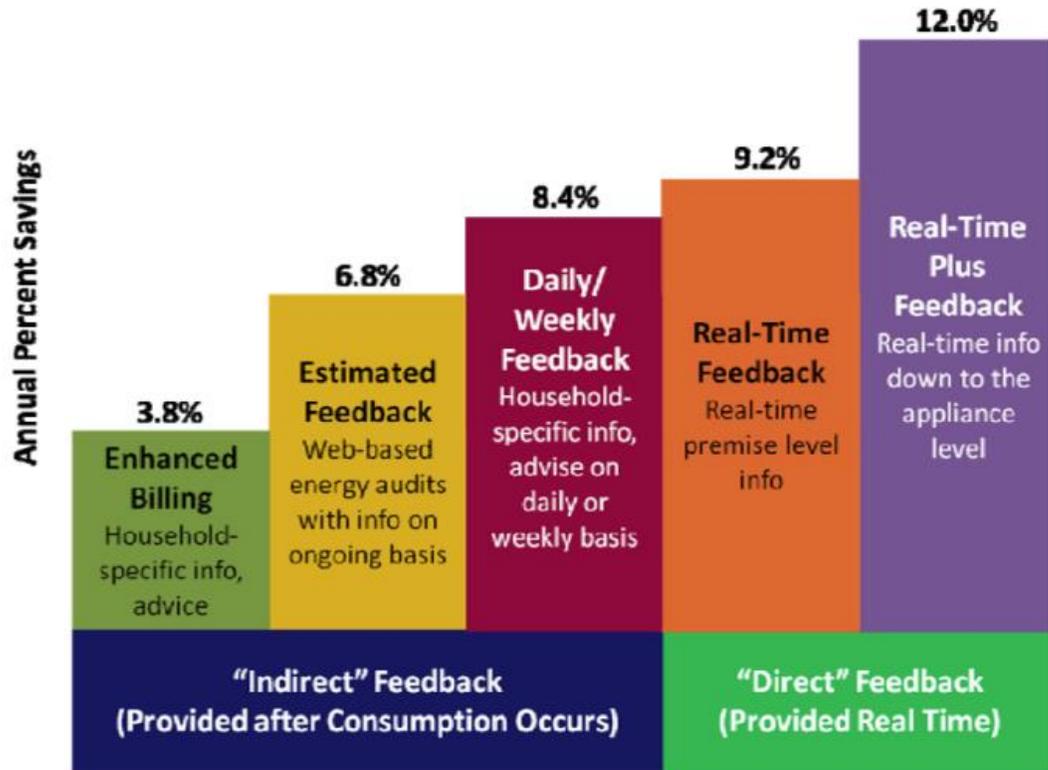
50 A. Maximizing consumer access to more granular information about their energy
51 consumption allows them to select applications such as energy management
52 software or devices (such as smart thermostats) that fit their needs, and allows for
53 the development and adoption of innovative products and services to assist
54 consumers in managing energy consumption and expenditures.¹

55 Studies have shown that customer access to real-time consumption
56 information has a significant impact on energy efficiency and behavior change. A
57 2010 report by the American Council for an Energy-Efficient Economy (ACEEE)
58 found that, if customers are given context, suggestions, and encouragement,
59 household energy savings from smart meter interval data could potentially be as
60 high as 12 percent.² This requires not just timely access to data, but an unlocking of
61 the innovation of the third-party software and hardware development community to
62 provide the necessary feedback and control mechanisms.

¹ Statement of national policy adopted from *EISA, National Broadband Plan, White House 21st Century Grid, Sen. Udall E-Access Bill*.

² “Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities,” *American Council for an Energy-Efficient Economy*; June 2010 --- ACEEE Report Number E105, <http://sedc-coalition.eu/wp-content/uploads/2011/06/ACEEE-08-06-01-Energy-Information-Feedback-Studies1.pdf>.

Average Household Electricity Savings (4-12%) by Feedback Type



Based on 36 studies implemented between 1995-2010

63

64 Source: “Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review
65 for Household Electricity-Saving Opportunities,” American Council for an Energy-Efficient
66 Economy; June 2010 --- ACEEE Report Number E105

67 **Q. How does the deployment of AMI in Illinois affect what customer usage**
68 **data is available?**

69 A. AMI enables utilities, customers and third parties such as retail electric suppliers or
70 providers of energy efficiency and demand response programs to see in much smaller
71 increments than monthly or daily how energy usage changes. This new information
72 can also be shared much faster than in the past with customers – rather than having
73 to wait for a monthly meter read, customers can now see their usage in real-time or
74 close to real-time.

75 **Q. How do these changes affect programs the utilities offer now?**

76 A. Having more granular data on how customers use electricity directly impacts
77 programs such as the energy efficiency programs offered by ComEd and Ameren
78 right now. For example, this data can be used to improve the measurement and
79 verification of savings associated with these programs. In similar fashion, this data
80 can be used to expand the purchase of energy efficiency by the Illinois Power
81 Agency, which last year proposed purchasing energy efficiency as a supply resource.³
82 In fact, the Energy Infrastructure Modernization Act (“EIMA”) explicitly links the
83 deployment of AMI and the promotion of policies and investments supporting the
84 development and incorporation of demand resources like energy efficiency and
85 demand response, the deployment of real-time, automated and interactive
86 technologies; integration of “smart” appliances and consumer devices; and the
87 provision to consumers of timely information and control options.⁴ More detailed
88 customer usage data is necessary to realize those policy goals.

89 **Q. What is the value of these types of programs to customers?**

90 A. I like to think that all stakeholders working towards a successful deployment of AMI
91 – utilities, retail suppliers, the Commission and third parties like CUB and EDF –
92 want customers to benefit from new dynamic pricing options, expanded energy
93 efficiency programs and new in-home energy management technologies. These are
94 things that will, taken together, provide Illinois consumers a chance to directly
95 benefit from EIMA investments by reducing their energy consumption, especially at
96 critical times in the day when it costs the most or has the greatest impact on the
97 environment. Consumers should have access to interval usage data that will help
98 inform their decision making, and provide a real-time window into how they use

³ See In Re Illinois Power Agency, Petition for Approval of the 2014 Procurement Plan, ICC Docket No. 13-0546, Order at 39-40 (Dec. 18, 2013).

⁴ 220 ILCS 5/16-108(a).

99 electricity.

100 **Q. How does having more data improve things like energy efficiency?**

101 A. Energy efficiency and demand response programs are designed around the energy
102 consumption habits of consumers, which in turn are based on many variables unique
103 to a customer's home characteristics, behavior, and occupancy. Access to more
104 granular usage data means that we can begin to connect our real-time behavior to
105 real-time measurement, demonstrating a connection between our consumption of
106 electricity and the cost of electricity. Unlike other customer market behavior, such
107 as gasoline purchasing, where customers understand and connect consumption
108 directly with price – even driving across town to save a few cents per gallon on gas –
109 electricity customers do not typically associate electricity usage behavior as a
110 purchasing decision. People do not yet think about the cost of a kWh prior to
111 turning on a light, primarily because they don't have visibility into that cause and
112 effect. New third-party software and hardware solutions are entering the market
113 that allow smart meter information to be provided directly to customers at the point
114 where they are making their consumption decisions. These innovations include new
115 mobile phone "apps," home energy displays, or connected thermostats and light
116 bulbs. Establishing a consistent and predictable framework will enable these
117 innovations to use national standards for data access, preventing the need for a
118 developer to develop custom software for each utility around the country. As energy
119 efficiency programs become more sophisticated, and deeper savings are sought,
120 utilities, program administrators and independent third parties need access to
121 energy use information to target continuing sources of energy waste.

122

123 **Q. How does having this data affect demand response or dynamic pricing**
124 **programs?**

125 A. Dynamic pricing and demand response are predicated on creating an economic value
126 from changes in energy consumption patterns. Without access to customer usage
127 data, new third party services, energy efficiency providers, or demand response
128 administrators cannot enter residential customers into market programs that can
129 compensate them for their behavior change. This data could, for example, be used to
130 allow an alternative supplier to create benefit from a particular existing or future
131 dynamic pricing structure, to enter residential customers with smart thermostats
132 into a demand response or peak-time energy efficiency rebate program, or enable
133 other new smart home technology to enter the market.

134 **Q. What are the main principles behind the framework?**

135 A. The Open Data Access Framework builds on discussions that have taken place in
136 other Commission proceedings and workshops, and makes explicit some of the
137 principles that I think have been implied in those discussions:

- 138 • That the customer is the person with primary control over their own usage data.
139 While obviously the utility has access to that data, and can use that data to
140 improve services or develop new services, it is important to state outright that
141 the customer is the person in the driver's seat with respect to who has access to
142 their data.
- 143 • That customers should be able to see their data in as close to real-time as
144 practicable. As the ACEEE study shows, the sooner the customer can see their
145 data, the more their conservation of energy improves.

- 146 • That customers, and third parties that they authorize, should not have to seek
147 out their own usage data from the utility system – instead, utility systems
148 should be built to deliver that usage data directly to a device or program of the
149 customer’s choosing automatically as the customer wants.
- 150 • That there is value in having standard formats for data and a standard process
151 for customer authorization so that third parties can come to Illinois knowing
152 exactly how they have to design their products and how they are expected to get
153 authorization from customers to use their data.

154 **Q. Why is it important to recognize the customer as the primary owner of**
155 **their own usage data?**

156 A. Because there is value in the level of granular data that will be captured by the AMI
157 meters. For example, third parties or utilities who want to offer, say, new demand
158 response programs, can design better programs because they will have more
159 information about how customers change usage in response to price or other factors.
160 Oftentimes programs like demand response deliver revenues to the customers and
161 third parties, so there is a real economic value to this data. Utilities which use this
162 type of data to design those programs are often directed to use those revenues to
163 offset costs for energy efficiency or demand response programs. That is absolutely
164 the right thing to do, and again shows the value of this data.

165 **Q. Why is real-time feedback important?**

166 A. Demand response or dynamic rates both ask customers to respond quickly to
167 changes in the price of electricity. Many of those programs work best when a
168 customer has invested in a device such as smart thermostat to respond by

169 conserving electricity quickly.⁵ A customer who is subject to dynamic pricing and
170 peak-time rates without access to that price and their consumption data is in effect
171 denied the major benefit of an investment that customer has financed. Having near
172 real time data access can increase the level of energy savings and customer
173 satisfaction of dynamic pricing programs.⁶

174 **Q. Why is it important that customers get their usage data delivered directly**
175 **to them from the utility?**

176 A. In practical terms, we're talking about the difference between a customer having to
177 go to a utility website and manually access a file with their usage data for some pre-
178 determined standard of time and instead having access to information that
179 automatically refreshes itself with new usage data. The vast majority of customers
180 who seek immediate access to interval data will be adopting the low- to no-cost
181 software solutions on their phone, tablet, or computer, rather than installing more
182 expensive smart home solutions such as a home energy display or smart appliances.
183 These devices can receive automatic usage data files from the meter or from the
184 utility, and can translate that data into direct feedback to the customer. The goal is
185 simply to make it easy for customers to learn about how their energy usage is
186 affecting their home and their pocketbook. Anything that requires an additional
187 step of having to pull data – rather than having it pushed to you – won't be as
188 effective in saving customers money.

189

190

⁵ Foster and Mazur-Stommen, *Results from Recent Real-Time Feedback Studies*, American Council for an Energy Efficient Economy, Report Number B122 (February 2012), at 2-5, <http://www.aceee.org/research-report/b122>.

⁶ Foster and Mazur-Stommen, *Results from Recent Real-Time Feedback Studies*, American Council for an Energy Efficient Economy, Report Number B122 (February 2012), at 9, <http://www.aceee.org/research-report/b122>.

191 **Value of the Illinois Open Data Access Framework**

192 **Q. What’s the purpose in having the Commission adopt an “Illinois Open Data**
193 **Access Framework?”**

194 A. This Open Data Access Framework sets forth principles which can be used by the
195 Illinois Commerce Commission to guide the development of AMI systems which
196 make consumption data available to retail customers (and third parties with
197 authorized customer access, including retail electric suppliers, municipal
198 governments and providers of demand response and energy efficiency services).
199 Over the past few months there have been multiple discussions in various dockets or
200 ICC workshops on these issues so I think the timing is right to consolidate those
201 discussions in one place and develop a concrete framework based upon them. While
202 I’m not an attorney, I understand that the Commission has now addressed some of
203 the legal questions around what types of data to which third parties and customers
204 should have access. This framework addresses the practical aspects of how third
205 parties and customers can access that data.

206 **Q. What is the value of having a framework like this adopted?**

207 A. It’s my understanding that, at this time, the utilities are working on designing their
208 data management and billing systems to handle the volume of new data that will be
209 available. They are also looking at how they will design, or, if necessary, redesign
210 their customer facing systems. This framework can provide certainty to the utilities
211 as they design these systems and tools because they will know what third parties,
212 including retail suppliers, and customers will expect from those systems and what
213 the Commission will expect from those systems.

214 **Q. How was the framework developed?**

215 A. Over the past few months, CUB and EDF have talked with a variety of groups which
216 offer demand-side products like smart devices which tie to energy efficiency
217 programs both within Illinois and nationally. The expectations laid out in the
218 framework are based on those discussions. We also looked back at what has been
219 discussed in prior Commission proceedings around the utility AMI investments, as
220 well as Commission workshops around how third parties might be expected to use
221 customer data. Fundamentally, this framework is based on how to deliver value to
222 customers.

223 **Q. How do you expect the Commission to use this framework?**

224 A. The framework lays out what the expectations are for the utilities, for customers
225 and for third parties. Once this framework is adopted, the Commission can use it to
226 evaluate whether or not the utility AMI plans are meeting expectations and address
227 whether or not any requests from third parties are reasonable. Given that, I expect
228 that over the new few months we will be refining this framework based on the
229 feedback given by the utilities or other third parties. In their Petition, CUB and
230 EDF have asked that this framework be finalized in time for use next spring by the
231 utilities in updating their AMI plans with that goal in mind.

232 **Q. What are main components of the framework?**

233 A. The framework is organized in rows, each row representing a separate issue:

- 234 • Ownership of data;
- 235 • Types of data;
- 236 • Third party access;
- 237 • Format;
- 238 • Methods of delivery;

- 239 • Timeliness;
- 240 • Billing-quality data;
- 241 • Data security;
- 242 • Following national standards; and
- 243 • Customer charges.

244 **Q. Please explain each row, starting with ownership.**

245 A. The ownership principles are meant to make explicit that, as I discussed above, the
246 customer is the primary owner of data. It clarifies that the utility’s role is to make
247 sure that customer data is secure, and that, if authorized, third parties have access
248 to it just as customers do.

249 **Q. What are the types of data?**

250 A. This row captures the four kinds of data that customers and third parties should
251 have access to: interval, consumption, power and pricing. “Interval” is meant to
252 make clear that shorter intervals are preferred for both power and energy recording
253 and sharing. Fifteen minute intervals are ideal, because the smaller the interval,
254 the more a customer or a third party can learn about usage patterns – and, in some
255 cases, learn what devices are drawing the most power and energy. It sets as a
256 maximum interval one hour, which is similar to what is currently captured for real-
257 time pricing customers. “Consumption” establishes the principle that any data used
258 for billing purposes, in the form of kWh, should be made available. “Power” data
259 refers to the additional information that can now be captured and used to improve
260 customer services or programs – while this is not an exhaustive list, these are
261 examples of the types of information that can be useful to customers and the utility
262 in refining distribution services or energy efficiency and demand response programs.

263 Lastly, the pricing principle means that customers should have access to any and all
264 price and rate data upon which they could make usage decisions. It's really
265 designed to make clear that the value of these meters will ultimately depend in part
266 on giving customers information in time so that customers can act by conserving
267 usage when usage is more expensive.

268 **Q. Third party access is the largest row, and the most detailed. Can you**
269 **explain what is in this principle?**

270 A. We tried here to capture a lot of the discussions which have already been had at the
271 ICC around third party and customer authorization requirements into clear and
272 concise guidelines. I think it's important to include them in the framework to show
273 the importance of customer authorization. The methods by which customers can
274 authorize access should be in the same place as the expectations for how third
275 parties can access that data. The various bullet points highlight the types of
276 authorization required, the length of the authorization, and notes where distinctions
277 have been drawn by the ICC as to types of data authorization. The key is that this
278 establishes that once a party has been authorized by a customer, that party stands
279 in the shoes of the customer for the length of time of the authorization (24 months is
280 what we recommend, or the length of time a customer might take supply service
281 from a RES). With that in mind, however, it also makes clear that the utilities –
282 since they need to safeguard customer data – might introduce a process for
283 approving third parties if there are any concerns on security or efficient
284 transmission of data. That process should be simple and without obstruction so as
285 to enable easy customer participation and access. Lastly, it also addresses the
286 protocol for third parties to gain access to anonymized usage data established in

287 prior ICC proceedings.

288 **Q. What is important about the format of the data?**

289 A. Data needs to be delivered in a way that can be seamlessly incorporated into other
290 programs, devices or services for the customer. That means that raw data must be
291 made available in a “machine-readable format” (sometimes also referred to in the
292 industry as “computer-readable format”), including summary data where
293 appropriate or where used for billing purposes. Summaries must be given for the
294 same time period for which the customer is ultimately notified or billed, whether
295 that’s monthly, hourly or in some smaller increment.

296 **Q. What is intended by identifying specific methods of data delivery?**

297 A. There are many ways that data can be shared with customers and third parties --
298 that’s part of the value in creating a seamless AMI network. For the customer, there
299 are multiple pathways for accessing their data. The meters can communicate with
300 the utilities through the AMI communication network but also directly to devices in
301 the home. Additionally, once the data is collected from the meter on the AMI
302 communications network, that data can be made available to customers directly
303 through the internet. I believe both ComEd and Ameren are building systems for
304 providing data over the internet through their own Web portals or mobile
305 applications. The important thing is that this makes clear that customers should
306 have multiple paths to access their usage data, not just one. That is important since
307 we should be building a smart grid where the customers choose the path that works
308 best for them.

309 **Q. Why is timeliness a separate item in the framework?**

310 A. The importance of having customers receive their usage data in a timely fashion is

311 probably best illustrated by the ACEEE study I included earlier. The quicker and
312 clearer a customer receives information about their energy usage, the more energy
313 efficient behavior will result. Data should be made available as quickly as possible to
314 the customer to ensure that they are provided feedback on efficiency actions as close
315 to the time of action as possible.

316 The various intervals laid out here – one hour if you are sending the data
317 through an internet or some other communications network, or one minute if you
318 are sending it directly from the meter – are based on a compromise balance of need
319 versus cost. We specify a different expectation for timeliness by method due to the
320 infrastructure and distance required for the transmission of data. Data can be
321 accessed directly from the meter by in-home devices very quickly and in short
322 intervals, and this framework makes sure that no irrational interval limitations are
323 placed on that direct access. However, data accessed through the internet has to first
324 be read from the meter, and passed through the AMI communication network to a
325 database.

326 For reference, if a customer were to notice a high-price period or seek to
327 participate in a demand response event, they would likely take action by shutting off
328 excess lights and electronics, and changing the temperature on their thermostat. If
329 they were relying on a software application reading data through the internet as a
330 low-cost data monitoring solution in their home, and did not receive feedback on
331 their usage changes until the next day (as is currently envisioned by the utilities),
332 they could possibly miss a chance to respond, jeopardizing financial compensation or
333 savings. A one-hour lag is more than generous for a data interchange that takes
334 seconds.

335 **Q. Why is a distinction drawn here between data and billing-quality data?**

336 A. While I'm not an attorney, it's my understanding that when utilities use data for
337 billing purposes, they must make sure the data is accurate according to Commission
338 rules. In the past this has typically meant validating that usage data against
339 algorithms that show the meter is functioning properly and the usage data is being
340 recorded properly. This, in turn, requires time and computing power. Utilities
341 prefer to do this processing for data verification overnight when there is little other
342 activity on their servers. Since it is important that customers receive feedback in as
343 close to real-time as possible, we want to be clear that while it is important to have
344 billing data treated in accordance with that the law and Commission practice
345 requires, *preliminary* data can be – and should – be delivered in as close to real time
346 as possible if it's for purposes other than billing. Given the accuracy level of the
347 metering infrastructure approved by the Commission, any errors in preliminary
348 data should be few and far between. The preliminary data as provided to customers
349 can be updated in the historical file if any errors are discovered through a regular
350 verification process.

351 **Q. What is important about data security?**

352 A. Everything. If customer usage data can't be kept secure, not only are there real
353 threats to customer privacy, there are real threats to customer acceptance of smart
354 meters. Illinois has been a leader in cyber security – in fact, the University of
355 Illinois at Urbana-Champaign has established an entire center dedicated to cyber
356 security. I know that both ComEd and Ameren have placed the highest priority on
357 this, and this principle extends that same expectation to any third party who has
358 access to customer usage data.

359

360 **Q. Is data security related to the next item, which is the need to follow**
361 **national standards?**

362 A. Yes. There have been efforts nationwide by a number of groups, most notably the
363 National Institute of Standards and Technology (“NIST”). It’s important that
364 Illinois continue to build off of, and incorporate, those efforts here. But the broader
365 goal of following national standards is to ensure that Illinois customers have access
366 to a broader network of hardware and software solutions. It is administratively
367 burdensome for hardware and software innovators to develop custom solutions for
368 each utility. Establishing a broad framework based upon consensus national
369 standards will ensure that innovations that meet those standards can be accessed
370 easily by Illinois consumers. Having said that, we also want to make clear that if the
371 utilities in Illinois develop new or innovative practices that meet our overall goals –
372 timely, secure delivery of granular usage data to customers – they should be able to
373 develop those practices.

374 **Q. Finally, what is meant by including a reference to a customer charge?**

375 A. While I’m not an attorney, I believe the ICC has made clear that while it is not
376 required, a utility might charge a fee for third parties to access usage data. With the
377 expectation that customers have the right to their usage data, it’s important to
378 establish that data shared in accordance with the various standards contained here
379 should be shared at no charge to the customer or a customer’s affirmatively
380 authorized third party.

381 **Q. Does this conclude your direct testimony?**

382 A. Yes, it does.