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Measuring distribution performance? Benchmarking warrants your attention

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ABSTRACT

Identifying, designing, and measuring performance metrics is critical to securing customer value, but can be a difficult task. This article examines the use of benchmarks based on publicly available performance data to set challenging, yet fair, metrics and targets.

Regulatory commissions in multiple states are considering how best to incorporate performance measures for electric distribution IOUs' compensation determination, whether as part of "grid of the future" proceedings (including Illinois' "Next Grid," Ohio's "Power Forward," and Rhode Island's "Power Sector Transformation"), or as part of utility-specific cases (including Eversource in Massachusetts, Xcel Energy in Minnesota, and National Grid and Central Hudson in New York). As these dockets progress, regulators must identify which aspects of performance to measure; design metrics to measure them; and establish fair but challenging targets for each metric. Each of these presents challenges, which are compounded by IOU proposals for process measures (as opposed to outcomes measures), easier-to-achieve targets, and ill-defined calculation specifics. Stakeholder concerns regarding the opportunity for shareholders to earn rewards without commensurate shareholder risks (asymmetry) are also valid and must be addressed.

This article examines the use of publicly available IOU financial and operating performance data to address these challenges through benchmarking. Benchmarking – the comparison of one organization's performance to that of other organizations on the same metric – has been a staple of U.S. industry for decades. Airlines are benchmarked on-time departure ratios; mobile phone networks are benchmarked on percent of geography covered, and automobiles are benchmarked on miles per gallon, to name just a few. In the electric industry, both the American Public Power Association and the Edison Electric Institute are known to conduct private benchmarking for their members' benefit. Public performance benchmarking programs are utilized by utility regulators in Australia, Finland, the Netherlands, New Zealand, and the United Kingdom – all of which are restructured markets (competitive generation) in which investor-owned utilities serve the monopoly distribution function. These benchmarking programs focus primarily on cost and reliability.[1]

Many IOUs argue that IOU-specific characteristics render benchmarking untenable and unreliable. The authors have researched this issue thoroughly, comparing multiple performance metrics to various

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[1] Smith, G and Wood, B. Performance Benchmarks Electricity Distribution Companies s in South Asia. Concept Paper prepared by Nexant for USAID contract 386-C-00-03-00135-00. November 2004. Pages 2–3 to 2–5.

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characteristics from 131 U.S. IOUs over six years using econometric analyses.[2] This research indicates that most expectations regarding the impact of various IOU characteristics on various IOU performance metrics to be unsupported by the data. Only a few commonly held beliefs are supported by statistically significant correlations between characteristics and performance, though in all such cases the correlations were weak. For those characteristics that do appear to have a limited impact on certain types of performance, peer group definitions can be used to segregate the performance of "like" IOUs for comparison and credible benchmarking.

This article examines the use of benchmarking as an input to, and/or method for, performance measurement. This article does not address other significant issues in performance-based compensation, from symmetry (penalties as well as rewards), and the proportion of compensation determined by performance, to the weighting of rewards/penalties for various metrics within in a cohort, and the timeframes for target attainment. However, it should be noted that performance measurement methods impact each of these complex issues, and vice-versa. As a result, the methods used for identifying, designing, and measuring performance metrics merits attention earlier in the compensation reform process than most commissions seem to appreciate.

1. Accountability for the performance of distribution investments is long overdue

The primary goal of performance-based compensation, and associated performance measurement, is to ensure customers receive commensurate value from increases in rates. As examples, customers might expect to receive reliability improvements, O&M cost reductions, or a better customer experience in exchange for an increase in distribution rate base (and, of course, corresponding rate increases). IOUs are increasingly labeling large increases in distribution rate base as "grid modernization," "infrastructure improvement," or "reliability and resilience" programs. Despite falling usage and peak demand per customer, IOU distribution rate bases are growing dramatically as indicated in Fig. 1.

Despite dramatic increases in distribution investment, reliability does not seem to be improving (Fig. 2). Nor do O&M costs appear to be decreasing, as would be expected if IOUs are making such investments at least in part to replace labor with capital (Fig. 3).

These data points appear to indicate that increased IOU performance accountability regarding distribution investment is long overdue. The challenge for regulators is to help ensure grid investments are optimized such that only the most valuable (relative to cost) capabilities are implemented, and that these investments deliver the greatest improvements in customer priorities for the least amount of cost. As regulators must meet this challenge despite deficits in information, resources, and technical experience, it is reasonable that they attempt to do so through outcomes-based performance compensation and metrics for distribution utilities. When identifying, designing, and measuring performance metrics, regulators will need to balance the goal of maximizing benefits for customers (the level of challenge a metric/target represents) against the goal of providing a reasonable opportunity for an IOU to secure incentives or avoid penalties (the level of fairness a metric/target represents).

What attributes will help ensure performance metrics and measurement methods appropriately balance challenge against fairness? This article addresses several such attributes expressed as capabilities, including the capabilities to (1) reflect best practices performance in targets; (2) accommodate changing circumstances; (3) improve relevance through comparisons to performance of "like" peer groups, and (4) reduce opportunities for IOUs to manipulate performance measurement processes. Regulators generally add a fifth attribute: administrative efficiency. This article will discuss how benchmarking can help deliver these five attributes, comparing benchmarking to the use of an individual IOU's historical performance for metric identification, design, and target-setting. The article concludes with a 2017 Customer Value Ranking of U.S. IOUs that considers four potential performance metrics: capital investment per customer; O&M spending per customer; reliability (system average interruption duration index, or SAIDI, without Major Event Days); and customer satisfaction (from J.D. Power and Associates' annual survey of U.S. residential electric distribution customers).

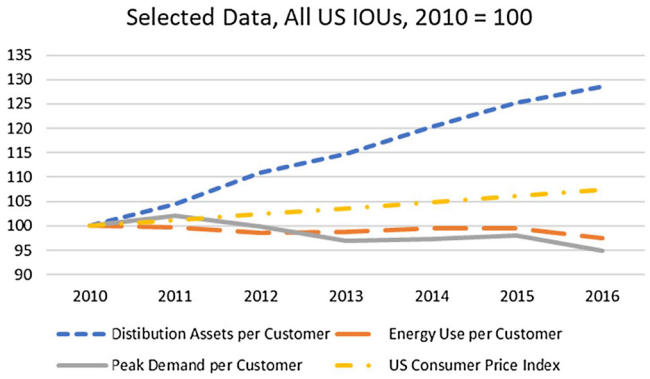

Fig. 1. Electric distribution plant per customer is growing rapidly despite falling consumption and demand.

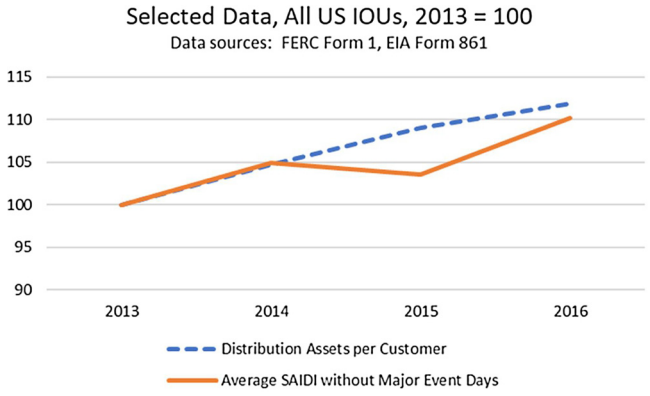

Fig. 2. Reliability is deteriorating despite rapidly growing investment in distribution plant.

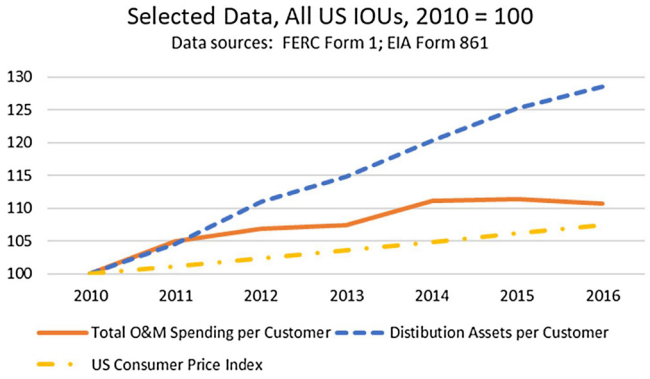

Fig. 3. O&M spending is outpacing inflation despite rapidly growing investment in distribution plant.

[2] Alvarez and Leonard. *Busting Myths: IOU Performance Can Be Credibly Benchmarked.* The Electricity Journal 30 (2017) 45–48.

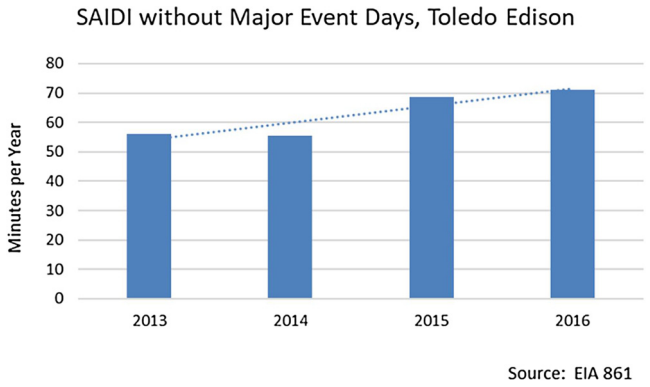

Fig. 4. Trend in SAIDI without Major Event Days, Toledo Edison.

2. Using benchmarks to reflect best practices performance in targets

Almost all performance measurement to date has been based on a specific utility's own historical performance. Such an approach can be very misleading. Consider an IOU with the historical reliability trend presented in Fig. 4. A regulator examining this data might conclude that this IOU's reliability performance is problematic, and might determine that a 10% reliability improvement in three years is an appropriate target. The IOU might then justify hundreds or thousands of dollars *per customer* in grid modernization investments to hit this performance target, from high-tech approaches like distribution automation to low-tech approaches like undergrounding overhead lines.

Now compare Figs. 4 and 5, which places the IOU's historical reliability into the context of all other IOUs' reliability performance. Should the knowledge that this IOU's reliability performance is already excellent (top quartile) relative to other IOUs make any difference to the regulator? To the priority assigned to reliability performance measurement? To the development of an aggressive improvement target? To the IOU's grid investment proposal? Most regulators would probably agree that while this IOU's reliability performance appears to be deteriorating slightly, the conclusion that reliability is a top priority problem for this IOU, and that the problem should be addressed by investing hundreds of millions of dollars in the IOU's grid, is probably incorrect given the IOU's reliability performance relative to other IOUs. In contrast, an IOU showing recent improvements in reliability, but for which reliability performance still ranks in the bottom 25% of all U.S. IOUs, probably does merit greater priority on reliability performance and more aggressive reliability improvement targets than such an IOU's performance history examined in isolation would suggest.

To summarize, an individual IOU's performance can be best be understood by examining it in relationship to the performance of other IOUs on the same metric (benchmarking). Historical performance

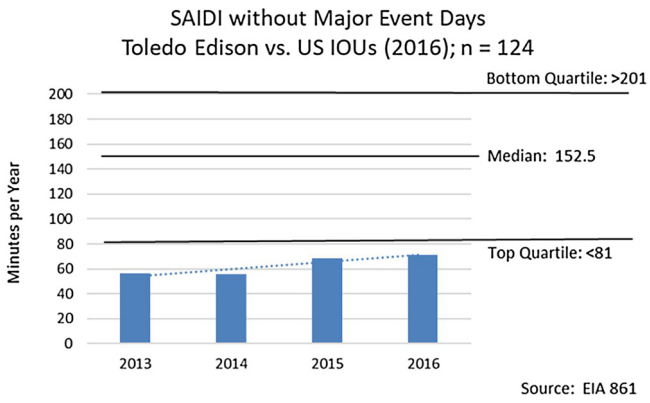

Fig. 5. Toledo Edison reliability performance relative to all U.S. IOUs.

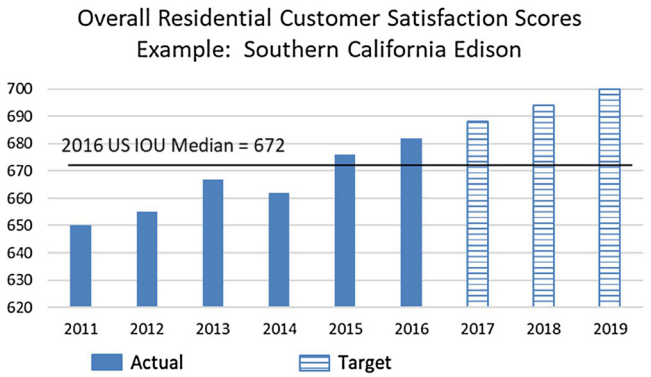

Fig. 6. Overall residential customer satisfaction scores, Southern California Edison vs. U.S. IOU average.

relates what a utility has done in the past, while benchmarking offers the opportunity to identify either minimum acceptable performance or best practice performance as demonstrated by other utilities. Moving from "improve on your past performance" to "perform at least as well or better than your peers" is a significant and valuable change in performance measurement expectations. Identifying, designing, and measuring IOU performance relative to peers' performance, as opposed to metrics based solely on a single IOU's historical performance, offers other important benefits too, as we shall examine next.

3. Using benchmarking to accommodate changing circumstances

Many IOUs are concerned their performance on a certain metric can be compromised by changes in circumstances beyond their control. Stakeholders likewise worry IOUs will be aided in reaching or exceeding a certain metric through changes in exogenous circumstances. Consider an IOU with an overall JD Power and Associates residential customer satisfaction score of 682 in 2016. As the median JD Power score was 672 for IOUs that year, a regulator might conclude that only moderate improvement in customer satisfaction performance is required (Fig. 6). For example, the regulator might establish a target customer satisfaction score of 700 within three years as a reasonably challenging, yet fair, performance metric.

Now assume that in the third year of the performance period, natural gas prices in the U.S. jumped 50% due to a perfect storm of conditions (extreme weather, a hurricane in the Gulf of Mexico, and LNG exports). All IOUs experienced these price increases and passed them along to their customers, resulting in large drops in customer satisfaction scores across the U.S. The IOU with a target satisfaction score of 700, which was once assailed by stakeholders as far too easy to hit, now has no chance of hitting its target satisfaction score through no fault of its own. The IOU will claim it deserves its customer satisfaction bonus anyway, stakeholders will claim it doesn't, and all manner of litigation will ensue.

Instead of establishing an absolute customer satisfaction score as an improvement metric for this utility, consider a performance metric defined in terms of performance relative to other IOUs. A relative performance metric might be expressed as "Increase JD Power overall residential satisfaction score from above-average to top quartile among U.S. IOUs in three years." (See Fig. 7.)

The advantage of relative, over absolute, metrics is that relative metrics change with changes in circumstances, be those changes favorable or unfavorable. Because a fuel commodity adjustment affects all U.S. IOUs similarly, a customer satisfaction metric expressed in terms relative to the performance of other IOUs stands a better chance of remaining relevant in times of changing conditions than an absolute performance metric based on an individual IOU's past performance.

Some observers might contend that all IOUs are not impacted similarly by a natural gas price spike. For example, the satisfaction

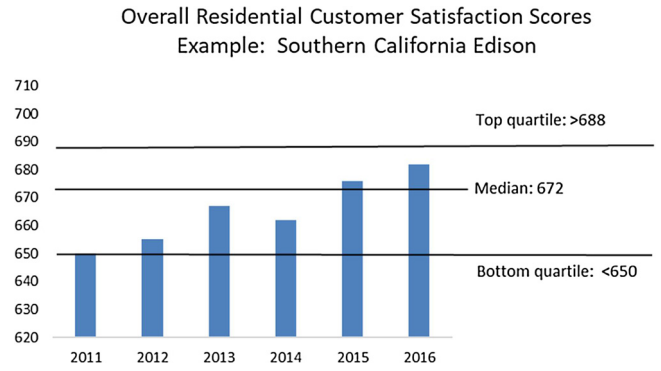

Fig. 7. Overall residential customer satisfaction scores, Southern California Edison vs. U.S. IOU performance quartiles.

measures of a utility that distributes both electricity and natural gas might be impacted more severely by natural gas price increases than the satisfaction measures of a utility which does not also distribute natural gas (like Southern California Edison), and vice-versa. For this benchmarking has another answer: peer grouping.

4. Using peer group comparisons to make performance measurement more relevant and credible

Sticking with the customer satisfaction/natural gas price increase example, let us attempt to address the fact that Southern California Edison does not have any combination (gas and electric) customers. By filtering out the results of IOUs that do have combination customers, the benchmarking becomes more relevant and credible, and associated metric prioritization, design, and measurement more refined.

For example, when IOUs with combination customers are filtered out, the median JD Power overall customer satisfaction score in 2016 falls to 669, and the score for top quartile performance falls to 681 (Fig. 8). So, while Southern California Edison's customer satisfaction performance was merely above average when compared to all IOUs, its performance registered top quartile when compared only to its peers (IOUs without combination customers).

This enhanced relevance provides regulators with greater context on which to base performance priorities and targets. Armed with this enhanced context, a regulator might refine the performance metric to "Retain top quartile JD power customer satisfaction scores relative to U.S. IOUs without combination (electric and gas) customers for the next three years." The regulator might also decide to assign a lower priority to customer satisfaction performance based on the improved relevance and context available through peer grouping, which indicates Southern California Edison's customer satisfaction performance is already fairly strong (top quartile) relative to other IOUs without combination customers.

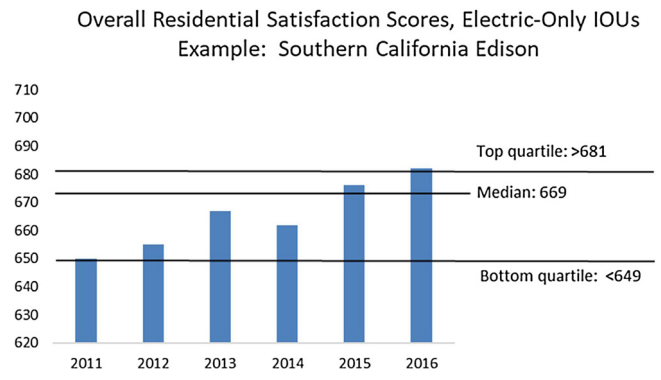

Fig. 8. Overall residential customer satisfaction scores, Southern California Edison vs. U.S. "electric only" IOUs.

5. Using benchmarking to reduce performance measurement process manipulation

Many regulators and stakeholders are concerned that performance-based compensation provides IOUs with outsized incentives to manipulate metric measurement processes to IOUs' advantage. This problem is mitigated to some extent through benchmarking and the use of standardized, public data sources.

The primary data sources used in this article are the FERC Form 1 (financial data) and the Energy Information Administration's (EIA) Form 861 (operating data), as well as the JD Power and Associates annual residential electric customer survey (overall satisfaction scores). While FERC Form 1 and EIA Form 861 data are reported by the IOUs themselves, some helpful data integrity protections are in place.

First, this data is available for public scrutiny, which encourages some level of data integrity in its own right. The Uniform System of Accounts adds standardization, as do the instructions provided to IOUs for completing the FERC Form 1 and EIA Form 861. By examining source data trends over time, abrupt changes can indicate potential measurement processes modifications and prompt investigations as necessary.

Second, the identification of individuals who can be held responsible for the accuracy of data submitted on standardized forms should serve to reduce unscrupulous measurement process changes. FERC Form 1 submissions must be signed by a corporate officer and a certified public accountant. Utilities' EIA Form 861 submissions must include the name and contact information of the person responsible for preparing the submission. These individuals can be called to testify in regulatory proceedings, allowing stakeholders to examine calculations and source data and to identify any mid-stream changes in metric measurement processes an IOU may have implemented. To minimize risks, however, regulators are strongly encouraged to clearly define calculations and data sources in advance for each metric specified as part of a performance-based compensation program.

Third, while an IOU might be able to manipulate its own metric measurement processes, an IOU is unable to manipulate the data reported by all the IOU peers against which the IOU's performance is being benchmarked. In other words, the context in which an IOU's performance is being evaluated is not subject to manipulation. While these data integrity protections do not eliminate manipulation concerns, they represent improvements over the protections available for unique metrics based on historical performance developed for each IOU individually.

6. Using benchmarking to promote administrative efficiency in performance measurement

Commissions are rightly concerned about the amount of resources that might be required to administer performance-based compensation programs in general, and for performance measurement specifically. The benefits of rigorous performance measurement to customers are likely to far outweigh regulators' administrative costs, but since regulators' resources are limited, efforts to improve administrative efficiency are nonetheless valuable and important to pursue.

The data sets described in this article are readily available for download via the FERC, EIA, and JD Power and Associates' websites. From there, a reasonably competent Microsoft Excel or Access user can complete the computations required for benchmarking with time and effort. Inexpensive software is also available to facilitate analyses and presentation of performance data from these sources. Finally, staff examination of standardized datasets is likely to be less resource-intensive than the development and administration of utility-specific datasets based on history and customized for specific purposes.

The salient point here is that standardized datasets useful for IOU

performance benchmarking already exist. A commission can reduce performance measurement administration costs, for both itself and for the IOUs it regulates, by taking advantage of existing reporting processes and data sources. "Recreating the wheel" is discouraged in favor of existing reporting processes and data sources for all but the most unique performance measurement needs. In fact, the presence of a large number of customized metrics in a performance-based compensation program is likely evidence that the program has strayed from IOU performance measurement into IOU micro management.

7. The 2017 electric IOU customer value ranking

The use of benchmarking to better understand distribution IOU performance is illustrated in the Customer Value Ranking of U.S. IOUs which follows this article. Electric IOUs were ranked on four performance metrics to create the Customer Value Ranking, including (1) capital spending per customer (lower is better); (2) O&M spending per customer (distribution operations, billing & customer service, and G&A, lower is better); (3) SAIDI without major event days (lower is better), and (4) overall residential customer satisfaction as measured by JD Powers & Associates' annual survey (higher is better).

The resulting Customer Value Ranking is a simple addition of IOUs' ranks in each of the four metrics. IOUs missing any one of the four metrics are not included in the ranking. IOU rankings for each of the four individual metrics are available at http://www.utilityevaluator.com/customer-value-rankings.html. (Regression analyses were used to adjust rankings in each individual metric for any statistically significant correlations to utility characteristics, such as customer density per line mile or peak demand per customer, found in the data. As described by the authors in previous work however, such correlations are few and weak,[3] resulting in only minimal changes from unadjusted rankings.) The authors calculate and release the Customer Value Ranking early in each calendar year. Top decile electric distribution IOUs in the 2017 Customer Value Ranking include:

1. Florida Power and Light
2. Public Service Colorado (Xcel Energy)
3. Indianapolis Power & Light (AES)
4. Mid-American Energy (Iowa)
5. PPL Electric Utilities (Pennsylvania)
6. NSP-Wisconsin (Xcel Energy)
7. NSP-Minnesota (Xcel Energy)
8. Public Service Electric & Gas (New Jersey)
9. Toledo Edison (First Energy)
10. Wisconsin Electric

Florida Power and Light placed first in the Customer Value Ranking for the second consecutive year. IOUs that placed in the top 10 for the first time this year include Public Service Colorado, Public Service Electric & Gas (New Jersey), and Wisconsin Electric.

8. Summary, additional observations, and conclusion

This article presents multiple reasons why a commission might want to consider benchmarking when establishing distribution IOU performance targets. These reasons include:

- The ability to reflect best practice performance from among all IOUs in targets;
- An increased likelihood that targets will remain relevant in times of changing circumstances;
- Increased relevance for performance measurement through the use of peer group comparisons;
- The reduction of performance measurement process manipulation opportunities;
- The reduction of administrative costs associated with performance measurement.

In addition to the incremental value which should accrue to a specific IOU's customers from performance benchmarking, collective benefits are available nationwide as the number of commissions which incorporates benchmarking into performance measurement grows. As benchmarking encourages more IOUs to research the best demonstrated practices and make beneficial changes to investment decisions and operating processes, industry-wide benchmarks as to what constitutes above-the-median performance (as an example) will rise over time. In a benchmarking environment, IOUs will therefore be required to deliver ever-improving performance to retain an above-the-median rating. As the use of benchmarks becomes more mainstream in performance metric identification, design, and measurement, a mutually reinforcing cycle of continuous process improvements and ever-increasing performance standards develops. Increased application of benchmarking therefore represents a win for IOU customers nationwide, as it introduces a form of competition into monopoly environments.

Regulators should consider benchmarking as a critical process input when identifying, designing, and measuring performance metrics as part of performance-based compensation programs. Doing so will help ensure performance metrics and targets are both challenging and fair, while failing to do so may prevent the promise of performance-based compensation and measurement from being realized. With interest in performance measurement on the rise, benchmarking's time has arrived for the U.S. distribution utility industry and its regulators.

Appendix A. 2017 Overall Customer Value Ranking

The Overall Customer Value Ranking is determined by individual rankings in capital spending (lower spend = higher ranking), O&M spending (lower spend = higher ranking), reliability (SAIDI without major event days, lower SAIDI = higher ranking), and customer satisfaction (JD Power, higher score = higher ranking). Utilities missing any one of the four individual determinants are not included in the Overall Ranking. Individual determinant rankings are available at www.utilityevaluator.com/customer-value-ranking.html

1	Florida Power & Light	35	Duke Energy Ohio	69	Ameren Missouri
2	Public Service Colorado	36	Idaho Power	69	Penelec
3	Indianapolis Power & Light	36	PECO	71	Tampa Electric Co.
4	Mid-American	36	Potomac Edison	71	Westar Energy
5	PPL	39	Duquesne Light	73	Duke Energy Carolinas
6	NSP-Minnesota	39	West Penn Power	74	Consolidated Edison
7	NSP-Wisconsin	41	Interstate Power & Light	75	Southern California Edison

[3] Ibid.

8	PSE&G	42	Northwestern Energy	76	Jersey Central P&L
9	Toledo Edison	42	Tucson Electric Power Co.	77	Narragansett Electric
10	Wisconsin Electric	44	Arizona Public Service	78	Delmarva Power
11	Nevada Power Co	45	El Paso Electric	79	Niagara Mohawk
12	Louisville Gas & Electric	46	Entergy Mississippi	80	Ohio Power
13	Wisconsin Power & Light	47	Alabama Power	81	Vectren
14	Cleveland Illuminating	48	Entergy Louisiana	82	Appalachian Power
15	Ohio Edison	49	Consumers Energy	83	CLECO
16	Gulf Power	50	Central Maine Power	84	Mississippi Power
17	Kentucky Utilities	50	KCP&L Greater Missouri	85	Massachusetts Electric
18	Wisconsin Public Service	52	Oklahoma Gas & Electric	85	PS New Hampshire
19	Otter Tail Power	53	Baltimore Gas & Electric	87	Eversource
20	Dayton Power & Light	54	Duke Energy Progress	87	Pacific Gas & Electric
20	Penn Power	55	Duke Energy Florida	89	New York State E&G
22	PacifiCorp	56	Duke Energy Indiana	90	Ameren Illinois
23	PNM	57	Georgia Power	91	Atlantic City Electric
24	Rochester G&E	58	Minnesota Power	92	Entergy Arkansas
25	Dominion Energy	59	South Carolina E&G	93	San Diego Gas & Electric
26	Duke Energy Kentucky	60	Emera Maine	94	Monongahela Power
27	Portland General Electric	60	PEPCO	95	Empire District Electric
28	Green Mountain Power	62	DTE Energy	96	United Illuminating
29	Entergy Texas	63	Avista	97	Connecticut Light & Power
30	PS Oklahoma	63	Madison Gas & Electric	98	Central Hudson G&E
30	Southwestern Public Svc.	65	Puget Sound Energy	99	Western Mass. Electric
32	Indiana-Michigan Power	66	KCP&L	100	Entergy New Orleans
33	Commonwealth Edison	66	Wheeling Power	101	Orange & Rockland
33	Metropolitan Edison	68	SWEPCO	102	Kentucky Power

Paul Alvarez is President of the Wired Group, a consultancy that helps consumer advocates and regulators maximize the value of grid modernization investments for customers. He is also the author of Smart Grid Hype & Reality, a book that identifies common shortcomings in grid modernization designs and implementation plans, as well as the challenges to customer benefit maximization inherent in today's utility compensation models. He has testified on these topics before utility regulators in 10 states. He has a B.A. in Finance from Indiana University and an M.A. in Management from the Kellogg School at Northwestern University.

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