STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF INDIANAPOLIS POWER & LIGHT COMPANY FOR APPROVAL OF IPL'S TDSIC PLAN FOR ELIGIBLE TRANSMISSION, DISTRIBUTION, AND STORAGE SYSTEM IMPROVEMENTS PURSUANT TO INDIANA CODE § 8-1-39-10.	**CAUSE NO. 45264**

Direct Testimony and Attachments of

Paul J. Alvarez

On behalf of

The City of Indianapolis

October 7, 2019

DP&L EX. ____

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

Table of Contents for the
Direct Testimony of Paul J. Alvarez

Direct Testimony of Paul J. Alvarez

I. Introduction, Qualifications, Purpose, and Preview

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A My name is Paul Alvarez. My business address is 6483 Big Horn Trail, Littleton, Colorado 80125.

Q WHAT IS YOUR OCCUPATION?

A I am the president of the Wired Group, a consultancy formed to increase the value delivered by distribution utilities relative to costs for residential and business customers.

Q ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?

A The City of Indianapolis. The City purchases substantial quantities of electricity from Indianapolis Power & Light ("IPL" or "Company") and is also concerned about the cost of the proposed plan on its citizens.

Q PLEASE DESCRIBE YOUR BACKGROUND AND EXPERIENCE.

A My career in the electric utility industry began 18 years ago with Xcel Energy, one of the largest investor-owned utilities in the U.S. After a series of product management roles of progressive responsibility for large corporations, including Motorola's Communications Division (now owned by Google), Baxter Healthcare, Searle Pharmaceuticals, and Walgreens, I developed new energy efficiency and demand response programs for residential and commercial and industrial customers, as well as programs in support of voluntary renewable energy purchases and renewable portfolio standard compliance.

In 2008 I left Xcel Energy to establish a utility practice for boutique sustainability consulting firm MetaVu, where I utilized my utility program M & V experience to lead two comprehensive evaluations of smart grid deployment performance, including an evaluation of the SmartGridCity™ deployment in Boulder, Colorado for Xcel Energy in 2010,[1] and an evaluation of Duke Energy's Cincinnati deployment for the Ohio Public Utilities Commission in 2011.[2]

I started the Wired Group in 2012 to help stakeholders, including consumer, business, and environmental advocates, regulators, and industry associations, increase the value delivered to customers from grid investments. I also teach a graduate course on renewable technologies, markets, and policy at the University of Colorado's Global Energy Management Program, and courses on distribution utility performance measurement and smart grid value creation at Michigan State University's Institute for Public Utilities (a program dedicated to educating new regulators and staff on utility industry concepts). I am the author of Smart Grid Hype & Reality: A Systems Approach to Maximizing Customer Return on Utility Investment. I am also the devloper of the Utility Evaluator, an Internet-based application which helps subscribers analyze and compare the financial and operating performance of US investor-owned electric distribution utilities (IOUs). I have a master's degree in management from the Kellogg School at Northwestern University, and a bachelor's degree in business from the Kelley School at Indiana University. Both degrees featured concentrations in Finance.

---

[1] *SmartGridCity™ Demonstration Project Evaluation Summary*. Exhibit MGL-1 to the testimony of Michael G. Lamb in the Matter of the Public Service Company of Colorado Application for Approval of SmartGridCity Cost Recovery. Filed with the Colorado PUC in 11A-1001E on December 14, 2011. Alvarez et al. Report dated October 21, 2011.

[2] *Duke Energy Ohio Smart Grid Audit and Assessment*. Public Utilities Commission of Ohio Staff Report, public version, filed in 10-2326-GE-RDR on June 30, 2011. Alvarez et al.

Q HAVE YOU APPEARED PREVIOUSLY BEFORE THE INDIANA UTILITY REGULATORY COMMISSION ("IURC" OR "COMMISSION")?

A No.

Q. HAVE YOU BEEN INVOLVED IN PROCEEDINGS BEFORE OTHER REGULATORY COMMISSIONS?

A. Yes. I have testified or developed evidence for 16 proceedings in 13 states. I have also served as a consultant to consumer and business advocates related to regulatory proceedings in 5 other states. In all these cases, my involvement related to distribution grid modernization spending or performance measurement. A full CV is provided as Appendix A to this testimony.

Q WHAT IS THE SUBJECT MATTER OF YOUR TESTIMONY?

A In this testimony I present my perspectives on IPL's proposed TDSIC Plan benefit-cost analysis.

Q PLEASE PREVIEW YOUR TESTIMONY AND CONCLUSIONS IN THIS PROCEEDING.

A I conclude that IPL's TDSIC Plan will cost customers far more than they will receive in benefits. In a review of testimony and workpapers, and through discovery, I have identified multiple, significant deficiencies in IPL's TDSIC benefit and cost projections. These include:

- IPL's reliability improvement calculations are based on assumptions which cannot be validated.

- The reliability improvements required to deliver the $1.5 billion in reliability value IPL estimates will be impossible to achieve.
- IPL also overstates the estimated customer savings benefits.
- IPL's cost estimate ignores an estimated $772 million in carrying charges customers will pay, a 63% increase over IPL's cost estimate.

II. IPL's Reliability Improvement Calculations Are Based on Unvalidated Assumptions

Q, DESCRIBE IPL'S BENEFIT COST ANALYSIS AND THE ROLE OF RELIABILITY IMPROVEMENT CALCULATIONS.

A. I summarize IPL's benefit-cost analysis[3] in the table below. IPL estimates that reliability improvements will be the source of 70% of the economic benefits from its TDSIC Plan, and almost 60% of reliability improvement value will come from prospective asset replacement (5 Plan components).[4] Reliability improvement calculations are critical to IPL's claim that its Plan delivers benefits in excess of costs.

Table 1: IPL TDSIC Customer Benefit Summary

Source	Reliability Benefit Value (in millions)	Operating Cost Savings (in millions)
Distribution Automation	$429	$68
Tap Reliability Improvement Projects	207	50
Prospective Asset Replacement	872	532
TOTALS	**$1,508**	**$650**

[3] IURC Cause No. 45264. IPL Attachment BLB-2, Table 3.3, p. 22.
[4] Per IPL's TDSIC Plan, these are 1) Circuit Rebuilds; 2) Substation Assets Replacement; 3) XLPE Cable Replacement; 4) 4kV Conversion; and 5) Remote End – Breaker Relay/Upgrades.

Q. WHAT SYSTEM-WIDE RELIABILITY IMPROVEMENTS DOES IPL EXPECT FROM ITS TDSIC PLAN?

A. Reliability is measured through methods standardized by the Institute of Electrical and Electronics Engineers, or IEEE. IEEE Standard 1366 describes how to calculate reliability statistics like CAIDI (Customer Average Interruption Duration Index), SAIDI (System Average Interruption Duration Index), and SAIFI (System Average Frequency Interruption Duration Index) used to measure electric reliability. IPL provides no estimate of the system-wide reliability improvements it expects from its TDSIC Plan. In discovery, IPL responded only with "IPL has chosen the investment plan that deploys capital at the highest efficiency risk reduction rate."[5] As City witness Stephens points out, deploying capital in a way that reduces the greatest asset failure risk is much different than deploying capital such that benefits exceed costs. Given that IPL's own benefit-cost analysis indicates that the Plan would not be cost effective without reliability improvements, the lack of reliability improvement estimates is a troubling observation.

Q. IF IPL DOES NOT PROVIDE RELIABILTY IMPROVEMENT ESTIMATES, HOW DOES IPL CALCULATE A VALUE FOR RELIABILITY-BASED CUSTOMER BENEFITS?

A. IPL states it used the US Department of Energy's Interruption Cost Estimator tool to translate reliability improvements into customer dollar values. The Interruption Cost Estimator, or ICE, is an Internet-based application which requires, as inputs, improvements in standardized reliability measures (CAIDI or SAIDI and SAIFI). The tool employs research-supported estimates for the value of electric service (and

[5] IURC 45624. IPL response to DR IG 1-10, Attachment PJA-3.

therefore the cost of service lost) by customer class (residential, commercial, and industrial), and multiplies by the number of customers in each class who stand to benefit from the reliability improvement action. The driver of reliability value in dollars is the estimated improvement in SAIDI or CAIDI and SAIFI. Get those estimates wrong, and the customer dollar values are wrong. Without reliability improvement estimates, it is unclear how IPL calculates a value for reliability-based customer benefits.

Q. WITHOUT KNOWING THE IMPROVEMENTS IN CAIDI OR SAIDI AND SAIFI, HOW CAN IPL'S VALUATION OF RELIABILITY-BASED CUSTOMER VALUE BE VALIDATED?

A Without the improvement in CAIDI or SAIDI and SAIFI, IPL's reliability improvement valuations cannot be validated. Two deficiencies are troubling. First, IPL goes to great lengths to describe the asset failure risk reductions of its prospective asset replacement program. But IPL has no details regarding how asset failure risk reductions translate into reliability improvements, which in turn will somehow deliver $872 million in customer benefits over 20 years. Second, IPL expects its tap reliability improvement projects program to deliver $207 million in reliability benefits over 20 years. Yet tap reliability improvement program does not specify projects, and consists only of an $11 million-a-year budget applied to the least reliable circuit taps. Without knowing what the tap projects are, it is impossible to estimate the reliability improvements the tap projects will deliver.

Q. ARE ANY OF IPL'S RELIABILITY IMPROVEMENTS AND CUSTOMER ECONOMIC BENEFIT PROJECTIONS REASONABLE?

A. Yes. IPL estimates the reliability benefits of its distribution automation plan to be $429 million over 20 years, and the energy efficiency benefits to be $68 million over 20 years. I find the combined benefits IPL calculates for its distribution automation capabilities, including Fault Location, Isolation, and Service Restoration (FLISR) and Conservation Voltage Reduction (CVR), to be aggressive, but may be possible. I also agree with City witness Stephens' recommendation that extensive annual performance reporting on IPL's CVR program should be required as a condition of approval owing to IPL's throughput incentive.

Q. WHAT ABOUT METER REPLACEMENT? DO YOU BELIEVE THAT COMPONENT OF IPL'S TDSIC PLAN TO BE COST-EFFECTIVE?

A. No. Per IPL's own data, the Meter Replacement capital cost of $55.9 million,[6] not including the additional carrying charges customers will have to pay, far exceeds the benefit of the program ($17.6 million).[7] My experience is that it is extremely difficult for smart meter benefits to exceed costs, even in the best circumstances. As IPL has already automated meter reading – a key smart meter benefit – I am not surprised that IPL's Meter Replacement proposal is not cost-effective. Based on a lack of cost-effectiveness, I recommend the Commission reject this component of IPL's TDSIC Plan.

[6] IURC Cause No. 45264. IPL Attachment BJB-2(Public), Table 2.1. p. 12.
[7] IURC Cause No. 45624. IPL Attachment BJB-2(Public), Table 6.6.2. p. 50.

III. The Reliability Improvements Required to Deliver the $1.5 Billion in Reliability Value IPL Estimates From Its TDSIC Plan Will Be Impossible to Achieve.

Q. YOU HAVE TESTIFIED THAT GAPS IN IPL'S RELIABILITY IMPROVEMENT ESTIMATES MAKE IT IMPOSSIBLE TO VALIDATE IPL RELIABILITY VALUATIONS. IF YOU CANNOT VALIDATE IPL RELIABILITY VALUATIONS, HOW DO YOU KNOW IPL'S RELIABILITY-RELATED CUSTOMER BENEFIT ESTIMATES ARE OVERSTATED? COULDN'T IPL BENEFIT ESTIMATES BE UNDERSTATED?

A. As IPL could not quantify reliability benefit estimates,[8] I resorted to a different approach to answer the question "What reliability improvements, in terms of SAIDI and SAIFI reductions, would be required to deliver $872 million in prospective asset replacement benefits and $207 million in tap reliability improvement project benefits?" Using the same ICE tool IPL claimed to have used in the valuation of reliability improvements, and using IPL-specific inputs the ICE tool requires, I was able to interpolate SAIDI and SAIFI improvements which would deliver $1.079 Billion in reliability-related customer value over 20 years. The table below documents the inputs to the ICE tool I used.[9]

Interruption Cost Estimator Input	Input Value
State Interruption Cost Values to Use:	Indiana
Non-residential customer count:	54,659
Residential customer count:	440,693
Initial year of improvement:	2023 (half way through the Plan)
Expected lifetime of improvement:	20 years
Annual inflation rate:	2%
Discounted cash flow rate:	0% (returns nominal, not present, value)
SAIDI starting point:	0.95 interruptions
SAIFI starting point:	67.5 minutes

[8] Id.
[9] IPL EIA Form 861 2018 (US Department of Energy) / IURC 45264 IPL Attachment CAR WP-1, Lines 2, 3, 8, and 9.

Using this approach, I found that IPL needed to achieve 42% improvements in both SAIDI and SAIFI in order to deliver $1.079 billion in reliability-related customer value over 20 years:

SAIDI after improvements: 39.15 minutes per interruption (a 42% improvement)

SAIFI after improvements: 0.55 interruptions per year (a 42% improvement)

Q. WHAT DOES THIS EXERCISE TELL YOU ABOUT THE RELIABILITY-RELATED BENEFITS IPL PROJECTS FOR ITS TDSIC PLAN?

A It tells me that IPL's TDSIC Plan drastically over-estimates the benefits of the plan, and is unlikely to deliver reliability-related benefits anywhere near those IPL projects. Let's assume that equipment failures represent 20% of all outages. (This is a generous assumption, as weather, auto accidents, human error, animals cause outages in far greater frequencies than equipment failure.) Let's further assume that IPL's TDSIC Plan eliminates the risk of equipment failure completely (another generous assumption) by replacing 20% of assets (the percent of substation assets IPL plans to replace prospectively).[10] By reducing the 20% of all outages caused by equipment failure by 20%, one would expect a reliability improvement of at most 4% overall (20% reduction in the cause of 20% of outages). This is not even 10% of the 42% reliability improvement the ICE tool indicates would be needed to achieve IPL's $1.079 billion benefit projection for prospective asset replacement and tap reliability improvement projects.

[10] IURC. IPL Attachment BJB-2 (Public), Table 6.6.2. p. 34.

IV. IPL also overstates the economic benefits from sources other than reliability improvements.

Q. WHAT ABOUT THE OTHER SOURCES OF CUSTOMER BENEFITS IPL CITES? DO YOU ALSO BELIEVE THESE ESTIMATES ALSO TO BE OVERSTATED TOO?

A. Yes. Let's examine IPL's claim that with prospective asset replacement it will save $532 million over 20 years by reducing the amount of work it does reactively upon equipment failure. This estimate assumes IPL's prospective replacement will be 100% accurate, i.e., that all the equipment IPL is replacing prospectively would have failed during the seven-year TDSIC Plan period. As discussed in City witness Mr. Stephens' testimony, due to inconsistency in equipment failure, only some of these assets would have failed. IPL cannot take credit for reducing the cost of reactive work which never would have been completed, as some of the assets would not have failed. For example, if 60% of the assets IPL replaced prospectively would not have failed – a likely possibility – then prospective replacement only would have provided 40% of the reactive work savings IPL estimates.

Q. DO YOU HAVE OTHER EXAMPLES OF INFLATED BENEFITS?

A. Yes. IPL claims the Tap Reliability Improvement projects will save $50 million in operating expenses over 20 years. In discovery, when asked how many headcounts IPL would reduce to secure these benefits; IPL's response is zero.[11] It is difficult to understand how IPL can estimate $50 million in customer benefits from zero headcount.

[11] IURC Cause No. 45264. IPL response to City DR 2-8(b), Attachment PJA-4

Q WHAT ABOUT IPL'S CLAIM ABOUT THE ECONOMIC DEVELOPMENT BENEFITS?

A. Yes, I believe some parts of IPL's proposed $1.2 Billion capital spend will deliver economic benefits to some parts of the central Indiana economy. But the study IPL commissioned, which estimates the Marion County economic development benefits at $92 million annually over the seven-year plan Period, is fundamentally flawed. In developing an economic development estimate from utility capital spending, an economist must also take into account the detrimental effects of any rate increases associated with that spending. IPL's study does not do this. If approved, IPL estimates the TDSIC Plan will increase distribution rates by 10%. This is over and above any rate increase IPL may request through traditional means during the TDSIC Plan period. (By 2026, the TDSIC rate increase will amount to $144 million annually,[12] a 10% increase over the revenue requirement of $1.413 billion approved in IPL's most recent rate case.)[13]

Utility rate increases manifest in multiple ways throughout a local economy. Retailers must raise prices; government may need to raise taxes or reduce other services, businesses may look elsewhere for expansion, some business shift production to out-of-state or overseas facilities; and some businesses become more likely to close. Due to the inelastic nature of electricity demand, increases in electricity prices act as a tax on the economy. It is certainly plausible, if not likely, that the negative impact of electric rate increases on economic development offset, or even exceed, the positive impact of utility capital spending. Furthermore, the rate increases

[12] IURC Cause No. 45624. IPL Attachment CAR-1WP, tab "CAR-1 Revenue Requirement", cells K25+K50.
[13] IURC Cause No. 45029. Order dated October 31, 2018. Page 34.

associated with IPL's TDSIC Plan will persist, impacting the central Indiana economy, for 30-40 years, while the economic benefits may only accrue in the first seven years. And if a utility's capital spending goes to out-of-state equipment manufacturers and suppliers, it lends more credence to the notion that IPL's TDSIC Plan will be more of a drain on the central Indiana economy than a boon.

V. IPL's cost estimate ignores $772 million in carrying charges customers will pay in the first 20 years alone.

Q. HOW HAS IPL UNDERSTATED THE COSTS OF ITS TDSIC PLAN ON ITS CUSTOMERS?

A. In its benefit-cost analysis, IPL estimates the cost of its TDSIC Plan to be $1.218 Billion in capital over 7 years. But this is far less than the costs customers will actually end up paying. In addition to paying IPL a return of capital, customers also pay IPL's authorized profits on equity, its income taxes on authorized profits, and its interest on debt. Customers will pay these fees, called carrying charges, for as long as 40 years after IPL investments are made. Over time, carrying charges will significantly add up , particularly for assets with long lives as featured in IPL's Plan.

Q. HAVE YOU ESTIMATED THE CARRYING COSTS TO CUSTOMERS OF IPL'S TDSIC PLAN?

A. Yes. Using the revenue requirement working paper IPL provided with its Application[14] as a template, and maintaining all the same assumptions IPL used to develop its seven-

[14] Indiana URC 45624. IPL Attachment CAR WP-1.

year TDSIC revenue requirement, I estimate the revenue requirement for the first 20 years of IPL's TDSIC Plan, including carrying charges, to be $1.991 billion, 63% more than IPL's cost estimate of $1.218 billion. These calculations are summarized in Appendix B. I note again that IPL customers will be paying for the TDSIC Plan much longer than 20 years, likely for an additional 10 to 20 years, based on the long lives of TDSIC Plan assets.

VI. Summary, Conclusions, and Recommendations

Q PLEASE SUMMARIZE YOUR TESTIMONY

A In this testimony I've supported several observations about IPL's TDSIC Plan benefit cost analysis. The observations include:

- IPL's reliability improvement calculations are based entirely on assumptions which cannot be validated.
- The reliability improvements required to deliver the $1.5 Billion in reliability value IPL estimates will be impossible to achieve.
- IPL overstates the economic benefits from sources other than reliability improvements.
- IPL's cost estimate ignores carrying charges customers must pay, which I estimate at $772 million over the first 20 years, a 63% increase over IPL's estimate of $1.218 billion.

Q. BASED ON THESE OBSERVATIONS, WHAT CONCLUSIONS DO YOU DRAW?

A. I conclude that the costs of IPL's TDSIC Plan to customers will significantly exceed benefits.

Q. BASED ON THIS CONCLUSION, WHAT IS YOUR RECOMMENDATION?

A. I recommend the Commission reject IPL's TDSIC Plan on the basis that customer costs will significantly exceed benefits. This is a violation of the third requirement the TDSIC legislation specifies for Commission approval of utility TDSIC Plans.[15]

Q DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A Yes, it does.

[15] Indiana Code 8-1-39-10 (b)(3)

Appendix A – Curriculum Vitae of Paul J. Alvarez

Profile

After 15 years in Fortune 500 product development and product management, including P&L responsibility, Mr. Alvarez entered the utility industry by way of demand-side management rate and program development, marketing, and impact measurement for Xcel Energy in 2001. He has since designed renewable portfolio standard compliance and distributed generation rates and incentive programs. These experiences led to unique projects involving the measurement of grid modernization costs and benefits (energy, capacity, operating savings, revenue capture, reliability, environmental, and customer experience), which revealed the limitations of current utility regulatory and governance models. Mr. Alvarez currently serves as the President of the Wired Group, a boutique consultancy serving consumer, business, and environmental advocates, regulators, and non-profit associations.

Appearances and Research Projects in Regulatory Proceedings

Comments on Distribution Planning and Grid Modernization. Co-author with Dennis Stephens for ABATE, a business advocacy group. Michigan PSC U-20147. September 11, 2019.

Comments on Distribution Planning and Grid Modernization. Co-author with Dennis Stephens for the Office of Consumer Advocate. New Hampshire PUC IR15-296. September 6, 2019.

Critique of Pacific Gas & Electric's $285 million Grid Modernization Proposal. Joint testimony with Dennis Stephens on behalf of The Utility Reform Network in California PUC A.18-12-009. July 26, 2019.

Evaluation of Xcel Energy's Request for an Advance Determination of Prudence Regarding Natural Gas Generation Plant Purchase. Testimony before the North Dakota Public Service Commission. PU-18-403. May 28, 2019.

Critique of Smart Meter Replacement Program Implied by Proposed Duke Energy Ohio Global Settlement Agreement. Testimony before the Public Utilities Commission of Ohio on behalf of the Office of Consumer Counsel. Numerous cases including 17-0032-EL-AIR. June 25, 2018.

Support for Considering Duke Energy Grid Modernization Investments in a Distinct Proceeding. Testimony before the North Carolina Utilities Commission on behalf of the Environmental Defense Fund. E-2 Sub 1142, October 18, 2017 and E-7 Sub 1146, January 19, 2018.

Evaluation of Southern California Edison's Request to Invest $2.3 Billion in its Grid to Accommodate Distributed Energy Resources. Testimony before the California Public Utilities Commission on behalf of The Utility Reform Network. A16-09-001. May 2, 2017.

Evaluation of Kentucky Utilities/Louisville Gas & Electric Smart Meter Deployment Plan. Testimony before the Kentucky Public Service Commission on behalf of the Kentucky Attorney General in 2016-00370/2016-00371. March 3, 2017. Also in 2018-00005 May 18, 2018

Evaluation of National Grid's Massachusetts Smart Meter Deployment Plan. Testimony before the Massachusetts Department of Public Utilities on behalf of the Massachusetts Attorney General in 15-120. March 10, 2017.

Evaluation of Pacific Gas & Electric's Request to Invest $100 Million in Its Grid to Accommodate Distributed Energy Resources. Testimony before the California Public Utilities Commission on behalf of The Utility Reform Network, A15-09-001. April 29, 2016

Recommendations on Metropolitan Edison's Grid Modernization Plan. Testimony before the Pennsylvania Public Utilities Commission on behalf of the Environmental Defense Fund in R-2016-2547449. July 21, 2016.

Arguments to Consider Duke Energy's Smart Meter CPCN in the Context of a Rate Case. Testimony before the Kentucky Public Service Commission on behalf of the Attorney General in 2016-00152. July 18, 2016.

Evaluation of Westar Energy's Proposal To Mandate a Rate Specific to Distributed Generation-Owning Customers. Testimony before the Kansas Corporation Commission on Behalf of the Environmental Defense Fund, case 15-WSEE-115-RTS. July 9, 2015.

Regulatory Reform Proposal to Base a Significant Portion of Utility Compensation on Performance in the Public Interest. Testimony before the Maryland PSC on behalf of the Coalition for Utility Reform, case 9361. December 8, 2014.

Duke Energy Ohio Smart Grid Audit and Assessment. Primary research report prepared for the Public Utilities Commission of Ohio case 10-2326-GE. June 30, 2011.

SmartGridCity™ Demonstration Project Evaluation Summary. Primary research report prepared for Xcel Energy. Colorado Public Utilities Commission case 11A-1001E. October 21, 2011.

Books

Smart Grid Hype & Reality: A Systems Approach to Maximizing Customer Return on Utility Investment. Second edition. ISBN 978-0-615-88795-2. Wired Group Publishing. 360 pages. 2018. First edition 2014.

Noteworthy Publications

The Rush to Modernize: An Editorial on Distribution Planning and Performance Measurement. With Sean Ericson and Dennis Stephens. Public Utilities Fortnightly. July 8, 2019. Pages 116+

Modernizing the Grid in the Public Interest: Getting a Smarter Grid at the Least Cost for South Carolina Customers. Whitepaper co-authored with Dennis Stephens for GridLab. January 31, 2019

Modernizing the Grid in the Public Interest: A Guide for Virginia Stakeholders. Whitepaper co-authored with Dennis Stephens for GridLab. October 5, 2018.

Measuring Distribution Performance? Benchmarking Warrants Your Attention. With Sean Ericson. Electricity Journal. Volume 31 (April, 2018), pages 1-6.

Busting Myths: Investor-Owned Utility Performance Can be Credibly Benchmarked. With Joel Leonard. Electricity Journal. Volume 30 (October, 2017), pages 45-48.

Price Cap Electric Ratemaking: Does it Merit Consideration? With Bill Steele. Electricity Journal. Volume 30, (October, 2017), pages 1-7.

Integrated Distribution Planning: An Idea Whose Time has Come. Public Utilities Fortnightly. November, 2014.

Is This the Future? Simple Methods for Smart Grid Regulation. Smart Grid News. October 2, 2014.

A Better Way to Recover Smart Grid Costs. Smart Grid News. September 3, 2014.

Smart Grid Regulation: Why Should We Switch to Performance-based Compensation? Smart Grid News. August 15, 2014.

The True Cost of Smart Grid Capabilities. Intelligent Utility. June 30, 2014.

Smart Grid Economic and Environmental Benefits: A Review and Synthesis of Research on Smart Grid Benefits and Costs. Secondary research report prepared for the Smart Grid Consumer Collaborative. October 8, 2013. Companion piece: Smart Grid Technical and Economic Concepts for Consumers.

Maximizing Customer Benefits: Performance Measurement and Action Steps for Smart Grid Investments. Public Utilities Fortnightly. January, 2012.

Buying Into Solar: Rewards, Challenges, and Options for Rate-Based Investments. Public Utilities Fortnightly. December, 2009.

Notable Presentations

NASUCA Annual Meeting. Grid Modernization: Basic Technical Challenges Advocates Should Assert. Orlando, FL. November 13, 2018.

Illinois Commerce Commission, NextGrid Working Group 7. Using Peer Comparisons in Distributor Performance Evaluation. Workshop 3 Presentation. Chicago, IL. July 30, 2018.

NARUC Committee on Electricity. Using Peer Comparisons in Distributor Performance Evaluation. Smart Money in Grid Modernization Panel Presentation. Scottsdale, AZ. July 16, 2018.

Public Utilities Commission of Ohio, Power Forward Proceeding Phase 2. Getting a Smart Grid for FREE. Columbus, Ohio. July 26, 2017.

NASUCA Mid-Year Meeting. Using Performance Benchmarking to Gain Leverage in an "Infrastructure Oriented" Environment. Denver, CO. June 6, 2017.

NARUC Committee on Energy Resources and the Environment. *How big data can lead to better decisions for utilities, customers, and regulators.* Washington DC. February 15, 2016.

National Conference of Regulatory Attorneys 2014 Annual Meeting. *Smart Grid Hype & Reality.* Columbus, Ohio. June 16, 2014.

NASUCA 2013 Annual Conference. *A Review and Synthesis of Research on Smart Grid Benefits and Costs.* Orlando. November 18, 2013.

NARUC Subcommittee on Energy Resources and the Environment. *The Distributed Generation (R)Evolution.* Orlando. November 17, 2013.

IEEE Power and Energy Society, ISGT 2013. *Distribution Performance Measures that Drive Customer Benefits.* Washington DC. February 26, 2013.

Canadian Electric Institute 2013 Annual Distribution Conference. *The (Smart Grid) Story So Far: Costs, Benefits, Risks, Best Practices, and Missed Opportunities.* Keynote. Toronto, Canada. January 23, 2013.

Great Lakes Smart Grid Symposium. *What Smart Grid Deployment Evaluations are Telling Us.* Chicago. September 26, 2012.

Mid-Atlantic Distributed Resource Initiative. *Smart Grid Deployment Evaluations: Findings and Implications for Regulators and Utilities.* Philadelphia. April 20, 2012.

DistribuTECH 2012. *Lessons Learned: Utility and Regulator Perspectives.* Panel Moderator. January 25, 2012.

DistribuTECH 2012. *Optimizing the Value of Smart Grid Investments.* Half-day course. January 23, 2012.

NARUC Subcommittee on Electricity. *Maximizing Smart Grid Customer Benefits: Measurement and Other Implications for Investor-Owned Utilities and Regulators.* St. Louis. November 13, 2011.

Teaching

Post-graduate Adjunct Professor. University of Colorado, Global Energy Management Program. Course: Renewable Energy Commercialization -- Electric Technologies, Markets, and Policy.

Guest Lecturer. Michigan State University, Institute for Public Utilities. Courses: Performance Measurement of Distribution Utility Businesses; Introduction to Grid Modernization.

Education

Master of Management, 1991, Kellogg School of Management, Northwestern University. Concentrations: Accounting, Finance, Information Systems, and International Business.

Bachelor's Degree in Business Administration, 1984, Kelley School of Business, Indiana University. Concentrations: Marketing and Finance.

Certifications

New Product Development Professional. Product Development and Management Association. 2007.

Appendix B – TDSIC Revenue Req't with Carrying Charge 20-Year Cost Estimate

($ in millions)

Business Case Year:	TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rev Req't, Year 1 Capital	259.75	14.88	17.95	17.39	16.83	16.27	15.70	15.14	14.58	14.01	13.45	12.89	12.32	11.76	11.20	10.64	10.07	9.51	8.95	8.38	7.82
Rev Req't, Year 2 Capital	271.67	-	16.59	19.78	18.94	18.08	17.35	16.68	16.07	15.49	14.92	14.34	13.77	13.21	12.64	12.06	11.49	10.92	10.36	9.77	9.21
Rev Req't, Year 3 Capital	323.06	-	-	20.39	24.36	23.31	22.26	21.36	20.54	19.78	19.07	18.37	17.65	16.95	16.26	15.56	14.84	14.14	13.45	12.75	12.03
Rev Req't, Year 4 Capital	347.44	-	-	-	22.64	27.22	26.05	24.87	23.88	22.95	22.10	21.31	20.53	19.72	18.95	18.17	17.39	16.58	15.81	15.03	14.25
Rev Req't, Year 5 Capital	269.54	-	-	-	-	18.31	22.02	21.08	20.12	19.31	18.57	17.88	17.24	16.61	15.96	15.33	14.70	14.07	13.42	12.79	12.16
Rev Req't, Year 6 Capital	277.94	-	-	-	-	-	19.77	23.78	22.76	21.73	20.86	20.05	19.31	18.61	17.93	17.23	16.55	15.87	15.19	14.49	13.81
Rev Req't, Year 7 Capital	241.32	-	-	-	-	-	-	18.07	21.72	20.79	19.85	19.06	18.32	17.64	17.01	16.38	15.74	15.12	14.50	13.88	13.24
Total Revenue Requirment	1990.73	14.88	34.55	57.57	82.76	103.19	123.16	140.98	139.66	134.07	128.82	123.89	119.14	114.51	109.94	105.36	100.78	96.22	91.66	87.09	82.51

Data Request IG DR1 - 10

With respect to the projects involving reliability, provide the level of reliability improvement by different levels of program costs such as reliability improvements for 25%, 50%, 75%, and 100% of the total proposed reliability related expenditures.

Objection:

IPL objects to the Request on the grounds and to the extent it is vague and ambiguous. IPL further objects to the Request on the grounds and to the extent it solicits a compilation, calculation and analysis that IPL has not performed and objects to performing. IPL notes that the hypothetical posed in the Request does not provide sufficient information for the requested analysis to be performed. Subject to and without waiver of the foregoing objections, please see response below which explains the nature and scope of the analysis IPL has performed.

Response:

The IPL TDSIC Plan largely focuses on age and condition, and therefore assigns benefit to mitigating the risks associated with equipment failure-caused outages (i.e.; avoiding system reliability deterioration as opposed to improving reliability). See Burns & McDonnell's Risk Model Report (Appendix 8.3 of IPL Attachment BJB IPL TDSIC Plan). Further, the two projects monetized based on improved reliability (Tap Reliability Improvement Projects and Distribution Automation) require a total capital outlay of $285.1 million and the monetized benefits total $754 million (see Table 3.3 in IPL Attachment BJB-2 IPL TDSIC Plan).

The IPL Plan reflects a comprehensive and integrated portfolio of investments, aimed at producing a wide array of benefits for IPL's customers. It reflects a review of IPL's electric system, optimizing the balance between assuring safe and reliable service, implementing foundational elements for grid modernization, and mitigating risk (as defined in the Project Narratives, Section 6 of IPL Attachment BJB-2 IPL TDSIC Plan). The resulting investment level of $1.2 billion reflects an iterative prioritization process, focused on meeting the objectives as specified in the TDSIC Statute.

That said, IPL acknowledges that reliability is a component of risk reduction in the sense that reliability is impacted in the event of equipment failures (see Section 2 of Risk Model Report, specifically section 2.3). The different scenarios IPL analyzed are discussed in Section 5 of the Risk Model Report. As described in Section 5 of the Risk Model Report, IPL has chosen the investment plan that deploys capital at the highest efficiency risk reduction rate.

Data Request City DR 2 - 8

Refer to IPL Attachment BJB-2 (Public), page 22, Table 3.3.
a. Provide an electronic spreadsheet with all formulas and cells intact and unlocked which describes how TAP Reliability Improvement Program benefits for each year (1-20) from Repair/Line Clearance were estimated, and for which the nominal benefit totals $50 million.
b. Indicate how many headcount reductions in linemen, troublemen, and similar positions IPL will implement in order to achieve the nominal benefit totals estimated.

Objection:

IPL objects to the request on the grounds and to the extent it mischaracterizes the testimony and attachments filed in this Cause. IPL already provided an electronic spreadsheet with all formulas and cells intact and unlocked with the requested information in its case-in-chief. Subject to and without waiver of the foregoing objection, IPL provides the following response.

Response:

a. As we understand the request, IPL has already provided the requested spreadsheet with formulas and cells intact and unlocked. See IPL Witness BJB WP-1 Tap Reliability Improvement Project Financials. See also IPL Attachment BJB-2 IPL TDSIC Plan, page 19, Section 3.2.2 Self-Healing/Reliability Monetization.
b. The Request mischaracterizes the nature of the identified benefits. The calculated nominal benefits reflect repair savings, i.e. the avoided cost for not having to complete repairs. The identified benefits do not reflect cost savings stemming from employee reductions because the freed up labor resources will be used for other IPL work.

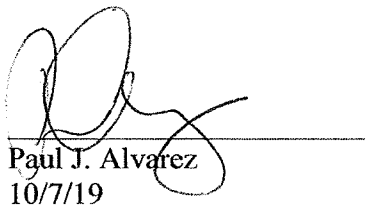
STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF INDIANAPOLIS POWER & LIGHT COMPANY FOR APPROVAL OF IPL'S TDSIC PLAN FOR ELIGIBLE TRANSMISSION, DISTRIBUTION, AND STORAGE SYSTEM IMPROVEMENTS PURSUANT TO IND. CODE § 8-1-39-10	))))))	CAUSE NO. 45264

VERIFICATION

I, Paul J. Alvarez, a Consultant of Wired Group, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.



Paul J. Alvarez
10/7/19

Summary: Exhibit DP&L Exhibit 11 (Indiana Testimony) electronically filed by Mr. Ken Spencer on behalf of Armstrong & Okey, Inc. and Gibson, Karen Sue Mrs.