BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission  :  R-2016-2537349
v.                                            :
Metropolitan Edison Company  :

ENVIRONMENTAL DEFENSE FUND &
CITIZENS FOR PENNSYLVANIA'S FUTURE

DIRECT TESTIMONY OF PAUL ALVAREZ

DATE:     JULY 21, 2016
I  INTRODUCTION

Q.  PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.
A.  My name is Paul Alvarez. My business address is PO Box 150963, Lakewood, CO 80215.

Q.  BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?
A.  I am the President of the Wired Group, a consultancy specializing in the optimization of distribution utility businesses and operations as they relate to grid modernization, demand response, energy efficiency, and renewable generation.

Q.  ON WHOSE BEHALF ARE YOU SUBMITTING TESTIMONY?
A.  I am testifying on behalf of the Environmental Defense Fund (EDF).

Q.  PLEASE DESCRIBE YOUR WORK EXPERIENCE AND EDUCATIONAL BACKGROUND.
A.  My career began in 1984 in a series of finance and marketing roles of progressive responsibility for large corporations, including Motorola’s Communications Division (now Android/Google), Baxter Healthcare, Searle Pharmaceuticals (now owned by Pfizer), and Option Care (now owned by Walgreens). My combined aptitude for finance and marketing were well suited for innovation and product development, leading to my first job in the utility industry in 2001 with Xcel Energy, one of the largest investor-owned utilities in the U.S. At Xcel Energy I served as product development manager, overseeing the development of new energy efficiency and demand response programs for residential, commercial, and industrial customers, as well as programs in support of voluntary renewable energy purchases and renewable portfolio standard compliance (including distributed solar incentive program design). As product development manager
I learned the economics of traditional monopoly ratemaking and associated utility economic incentives, as well as the impact of self-generation, energy efficiency, and demand response on utility shareholders and management decisions. I also learned a great deal about utility program impact measurement and verification (M & V).

I left Xcel Energy to lead the utility practice for boutique sustainability consulting firm MetaVu in 2008, where I utilized my M & V experience to lead two comprehensive, unbiased evaluations of smart grid deployment performance. To my knowledge these are the only two comprehensive, unbiased evaluations of smart grid deployment performance completed to date. The results of both were part of regulatory proceedings in the public domain and include an evaluation of the SmartGridCity™ deployment in Boulder, Colorado for Xcel Energy in 2010, and an evaluation of Duke Energy’s Cincinnati deployment for the Ohio Public Utilities Commission in 2011.

In 2012 I started the Wired Group to focus exclusively on distribution utility businesses and operations as they relate to grid modernization, demand response, energy efficiency, and renewable generation. Wired Group clients include utilities, regulators, consumer and environmental advocates, and industry associations. In addition I serve as an adjunct professor at the University of Colorado’s Global Energy Management Program, where I teach an elective graduate course on electric technologies, markets, and policy. I have also taught at Michigan State University’s Institute for Public Utilities, where I educated new regulators and staff on grid modernization and distribution utility performance measurement.
Finally, I am the author of *Smart Grid Hype & Reality: A Systems Approach to Maximizing Customer Return on Utility Investment*, a book that helps laypersons understand smart grid capabilities, optimum designs, and post-deployment performance optimization. I received an undergraduate degree in Finance from Indiana University’s Kelley School of Business in 1983, and a master’s degree in Management from the Kellogg School at Northwestern University in 1991. My Curriculum Vitae is attached as Appendix A to this testimony.

Q. **WHAT IS YOUR EXPERIENCE TESTIFYING BEFORE STATE UTILITY REGULATORY COMMISSIONS?**

A. I have testified before state utility regulatory commissions on the issues of grid modernization, demand response, energy efficiency, and renewable generation in California, Colorado, Kansas, Kentucky, Maryland, and Ohio.

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

A. The purpose of my testimony is to make recommendations relating to grid modernization for the Company’s distribution rate case. Specifically, I recommend actions related to 1) integrated Volt/VAR control and 2) integrated resource planning.

II. **INTEGRATED VOLT/VAR CONTROL**

Q. **PLEASE EXPLAIN WHAT INTEGRATED VOLT/VAR CONTROL (“IVVC”) IS.**

A. IVVC involves the management of various electric distribution system assets and advanced control technologies to “right-size” the voltage delivered to end-use electric customers. IVVC can be used to reduce overall voltage levels, while ensuring these voltages remain within acceptable standards for electric distribution. Reductions in distribution system voltage have been demonstrated to result in reductions in energy
consumption across the electric circuits on which these are applied. For example, a September 2014 report published by the U.S. Department of Energy ("U.S. DOE") on Duke Energy's smart grid investments entitled "Integrated Smart Grid Provides Wide Range of Benefits in Ohio and the Carolinas" found that it consistently achieved "2% voltage reduction" on over 200 Ohio distribution circuits where IVVC was deployed, "reducing system losses and fuel costs for Duke's power generation." Electric customers across circuits with active IVVC management and lower voltage levels, typically consume less energy without needing to make changes to their individual consumption behavior. Investments in IVVC technology and grid modernization can result not only in energy reductions, but also may provide additional visibility and operational flexibility in responding to a variety of dynamic system conditions.

Q. ARE ANY PENNSYLVANIA UTILITIES IMPLEMENTING IVVC PROJECTS?
A. Yes, but on a limited scale. A September 2014 project description published by the U.S. Department of Energy ("U.S. DOE") on First Energy's smart grid investments entitled "FirstEnergy Services Corporation Smart Grid Modernization Initiative" outlines the Company's approach to smart grid investments, including distribution automation and volt/VAR optimization systems. The report highlights the FirstEnergy's grid modernization initiative and future plans including evaluating the "scalability of all tested smart grid technologies to larger customer populations" and substantiating the "operating impacts", including "reduced carbon emissions."

In addition, my understanding is that PPL implemented a small test of IVVC as part of its $38 million smart grid investment grant. The project is described in a report entitled "Case Study – PPL Electric Utilities Corporation Smart Grid Investment Grant –
Building a Smarter Electric Distribution System in Pennsylvania.” This report is publicly available on the U.S. Department of Energy’s website at:


However, I can locate no further reference to IVVC expansion at PPL.

In addition, two Pennsylvania IOUs, PECO and West Penn Power, pursued IVVC as part of their Phase 1 Act 129 energy efficiency and demand response compliance plans. In the Plan Year 4 reports from these utilities, and from the Statewide Evaluator, IVVC (also known as Conservation Voltage Reduction, or CVR) was praised for its cost-effectiveness.¹

Q. WHAT RECOMMENDATIONS DO YOU HAVE REGARDING FURTHER IVVC DEPLOYMENT?

A. Realizing and accounting for peak demand reductions across select, locally constrained areas of the system could be used to defer capital investments planned in future years - investments which would otherwise be required to meet the projected demand for energy, given the constraints. IVVC could also reduce energy usage and greenhouse gas emissions. It is possible that the reduced greenhouse gas emissions could be used as a compliance tool for the U.S. EPA’s Clean Power Plan. The Company should evaluate as part of its distribution system planning process, whether the implementation of IVVC throughout its service territory would provide lower energy usage, lower peak demand, defer capital investments and reduce greenhouse gas emissions, ultimately benefiting customers and the environment. I recommend that the Company: submit a report to the

Commission and the stakeholders in this case describing: (1) the cost of the IVVC equipment it has installed to date and the resulting energy reductions, peak demand reductions, deferred capital investments and reduced greenhouse gas emissions; and (2) a cost/benefit analysis and implementation plan for installing IVVC equipment on the Company’s remaining circuits and substations, with a view toward fully using IVVC for peak demand reduction and for energy savings. Also, in the event the Company’s plan is approved by the Commission, I believe it is important that average voltage and power factor be reported by treated circuit annually. This will allow the Commission to verify continuous voltage reductions and power factor improvements resulting from the IVVC investment over time, and would also be helpful for emissions reduction and Act 129 compliance calculations.

In addition, I encourage the Commission to take steps to continue to address the utility throughput incentive. A 2-3% reduction in voltage that could be achieved through IVVC, for instance, could result in a 1-2% reduction in energy sales volumes. This harms IOU’s revenues and profits between rate cases, and could result in a disincentive for utilities to embrace measures that result in energy conservation and potential savings to customers.

I support the Commission’s interest in addressing this problem, as evidenced by the recent En Banc hearing on alternative ratemaking, for which the Environmental Defense Fund submitted testimony. Several methods are available to remove economic penalties to IOUs who exceed Act 129 goals, and I encourage the Commission to act upon its learnings to date on this issue.

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III. INTEGRATED RESOURCE PLANNING

Q. PLEASE EXPLAIN THE INTEGRATED RESOURCE PLANNING ("IRP") PROCESS.

A. The Regulatory Assistance Project ("RAP") defines an integrated resource plan as a "utility plan for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply-side and demand-side resources over a specified future period." RAP issued a June 2013 RAP report entitled "Best Practices in Electric Utility Integrated Resource Planning" that further explores this concept. In essence, integrated resource planning explores the business case of a broad portfolio of supply and demand side resources in meeting long-range energy needs, while ensuring that the selection of these resources is in alignment with desired policy outcomes.

Q. HOW SHOULD THE COMPANY UTILIZE CLEAN ENERGY RESOURCES IN ITS DISTRIBUTION SYSTEM PLANNING?

A. The Company should employ a combination of supply-side and demand-side resources, including clean energy resources, in meeting forecasted annual peak and energy demand in its distribution expansion planning practices. Consideration for these resources could expand the portfolio of cost-effective solutions used to meet the on-going demand for energy, as well as a number of possible policy objectives. States like New York, California, Washington, and Vermont have been and are continuing to explore incorporating a combination of supply and demand-side resources in meeting future energy needs.
Q. PLEASE DESCRIBE THE CALIFORNIA LAW RELATING TO DISTRIBUTION RESOURCE PLANNING.

A. In 2013, California enacted Public Utilities Code § 769, which requires utilities to submit comprehensive distribution resources plans to optimize their distribution systems. The law states:

769. (a) For purposes of this section, "distributed resources" means distributed renewable generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies.

(b) Not later than July 1, 2015, each electrical corporation shall submit to the commission a distribution resources plan proposal to identify optimal locations for the deployment of distributed resources. Each proposal shall do all of the following:

(1) Evaluate locational benefits and costs of distributed resources located on the distribution system. This evaluation shall be based on reductions or increases in local generation capacity needs, avoided or increased investments in distribution infrastructure, safety benefits, reliability benefits, and any other savings the distributed resources provides to the electric grid or costs to ratepayers of the electrical corporation.

(2) Propose or identify standard tariffs, contracts, or other mechanisms for the deployment of cost-effective distributed resources that satisfy distribution planning objectives.

(3) Propose cost-effective methods of effectively coordinating existing commission-approved programs, incentives, and tariffs to maximize the locational benefits and minimize the incremental costs of distributed resources.

(4) Identify any additional utility spending necessary to integrate cost-effective distributed resources into distribution planning consistent with the goal of yielding net benefits to ratepayers.

(5) Identify barriers to the deployment of distributed resources, including, but not limited to, safety standards related to technology or operation of the distribution circuit in a manner that ensures reliable service.
(c) The commission shall review each distribution resources plan proposal submitted by an electrical corporation and approve, or modify and approve, a distribution resources plan for the corporation. The commission may modify any plan as appropriate to minimize overall system costs and maximize ratepayer benefit from investments in distributed resources.

(d) Any electrical corporation spending on distribution infrastructure necessary to accomplish the distribution resources plan shall be proposed and considered as part of the next general rate case for the corporation. The commission may approve proposed spending if it concludes that ratepayers would realize net benefits and the associated costs are just and reasonable. The commission may also adopt criteria, benchmarks, and accountability mechanisms to evaluate the success of any investment authorized pursuant to a distribution resources plan.

Q. PLEASE EXPLAIN THE NEW YORK REGULATORY PROCEEDING RELATING TO DISTRIBUTION RESOURCE PLANNING.

A. The New York regulatory proceeding is known as “Reforming Energy Vision” and was opened in April by the New York Department of Public Service and the case number is 14-M-0101. The Commission’s objective is to transform the utility business model to make electric service more efficient, sustainable, and reliable while increasing the services provided to customers. Distribution resource planning is one element of this proceeding. The Commission Staff issued a report in this case on August 22, 2014 entitled: “Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues.” At page 10, the Staff Report discusses distribution resource planning projects in New York and other states:

Distribution investments: there are numerous examples of DER [distributed energy resources] being proposed to defer distribution investment. The Petition of Consolidated Edison, Inc. related to its Brooklyn/Queens Demand Management (BQDM) Program and the PSEG Long Island Utility 2.0 Long Range Plan filed July 1, 2014 illustrate both the potential benefits and the achievability of non-wires
alternatives. Consolidated Edison proposes to acquire 52 MW of
distributed resources to address overloaded distribution facilities.
PSEG Long Island proposes to spend up to $200 million on
distributed resources to, among other things, target two areas of
congestion. Non-wires alternatives are being proposed to improve
reliability and defer investments in other jurisdictions, as well. For
example, Vermont plans to defer $400 million in traditional T&D
investment through integration of energy efficiency programs into
transmission planning. In Washington, the Bonneville Power
Administration identified a package of demand response, direct load
control, distributed generation and energy efficiency to defer a 50
MW traditional investment.

An example of the IRP concept in practice is demonstrated in a transmission deferral
project implemented by Central Maine Power ("CMP") in the Boothbay Harbor region,
as explained in a March 4, 2014 report entitled "Interim Report: Boothbay Sub-Region
Smart Grid Reliability Project."

In addition, Consolidated Edison, Inc.'s long running Targeted Demand Side
Management program has demonstrated that demand side resources could be leveraged to
defer capital investments and meet the customers' demand for energy. In its approval of
the Demand Management (DM) program, the New York State Public Service
Commission noted that "the general goal of fostering the use of DM resources to offset
projected peak load growth is very important given the numerous public benefits DM alone
can provide in comparison with typical alternatives. Those benefits include reduced energy
consumption, reduced air pollution, avoidance of the environmental impacts associated with
construction of electric generation, transmission, and distribution facilities, increased supply
diversity, and increased economic growth."

Q. **DO YOU HAVE ANY RECOMMENDATIONS RELATING TO INTEGRATED SYSTEM PLANNING?**
The Company should explore including a broad portfolio of supply-side and demand-side solutions in meeting the future energy needs of its customers. A statewide market potential study has already been conducted and could be useful in this analysis. The Company should submit a report to the Commission and the stakeholders in this case describing: (1) what practices the Company currently follows to implement demand-side resources to meet its customers' energy needs; and (2) what additional practices the Company will implement, in light of the best practices I have described in my testimony, to expand its use of demand-side resources to meet its customers' energy needs.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.
VERIFICATION

I hereby verify under the penalties of perjury that the foregoing representations are true to the best of my knowledge, information and belief.

Signed: [Signature] Dated: 7/13/16

AFFIDAVIT

STATE OF COLORADO

COUNTY OF Jefferson

Paul Alvarez, being first duly sworn, deposes and says that he is President of the Wired Group and is testifying on behalf of the Environmental Defense Fund, an Intervenor in this proceeding; that as such he has executed the foregoing Verification and has authority to do so; that he has read said Verification and knows the contents thereof; and that the statements therein contained are true to the best of his knowledge, information and belief.

[Signature]
Paul Alvarez

Subscribed and sworn to before me, This 13th day of July, 2016.

[Signature]
Notary Public

My Commission Expires: 8-7-20

My County of Residence: Jefferson