OTS Statement No. 1
Witness: Kevan Deardorff

APPLICATION OF DUQUESNE LIGHT COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE UNDER SECTION 1102(A)(3) OF THE PUBLIC UTILITY CODE APPROVING THE ACQUISITION OF DUQUESNE LIGHT HOLDING, INC. BY MERGER
DOCKET NO. A-110510F0035

APPLICATION OF DQE COMMUNICATIONS NETWORK SERVICES LLC FOR A CERTIFICATE OF PUBLIC CONVENIENCE UNDER SECTION 1102(A)(3) OF THE PUBLIC UTILITY CODE APPROVING THE ACQUISITION OF DUQUESNE LIGHT HOLDING, INC. BY MERGER
DOCKET NO. A-311233F0002

Direct Testimony

of

Kevan Deardorff

Office of Trial Staff

Concerning:

Insufficiency of Affirmative Public Benefits of the Proposed Acquisition by Merger

Recommended Conditions for Any Commission Consideration of Approval

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kevan L. Deardorff. My business address is Pennsylvania Public Utility Commission, P.O. Box 3265, Harrisburg, Pa. 17105-3265.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am currently employed by the Pennsylvania Public Utility Commission as a Fixed Utility Financial Analyst with the Office of Trial Staff.

Q. WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?

A. A listing of my educational and professional background is provided as Appendix A to this testimony.

I. Subject of Testimony

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. This OTS Direct Testimony is presented to provide my expert opinion as to whether the proposed acquisition by merger of a corporate parent of Duquesne Light Company ("Duquesne" or Company) by the Macquarie Consortium is in the public interest. This testimony also recommends conditions the Commission should impose if the Commission were to decide to approve the acquisition by merger. My recommendations in those circumstances are in response to the current lack of adequate financial safeguards between Duquesne and its parent

Duquesne Light Holding Company ("DLH") to ensure that Duquesne is not exposed to financial risks as a result of activities of DLH's non-jurisdictional operations.

Q. DOES YOUR DIRECT TESTIMONY INCLUDE AN EXHIBIT?

A. Yes. OTS Exhibit No. 1 is being provided with this OTS Direct Testimony.

II. Company Position

Q. PLEASE PROVIDE A BRIEF DESCRIPTION OF THE MERGER.

A. The Pennsylvania utility subject to regulation by the Commission is Duquesne, a subsidiary of Duquesne Light Holding Company ("DLH"), whose shareholders have voted in favor of being acquired by DQE Holdings LLC, a Delaware limited liability company created and owned by the Macquarie Group. Under the terms of the proposed acquisition, Duquesne will continue to be a subsidiary of DLH. The Macquarie Group is comprised of a number of equity investors.

Q. WOULD YOU SUMMARIZE THE COMPANY'S CLAIMED ECONOMIC BENEFITS TO THE CUSTOMERS FROM THIS PROPOSED ACQUISITION BY MERGER?

A. Yes. Duquesne claims that the proposed acquisition by merger is in the public interest because of the following benefits: an Economic Development Plan for industrial customers; access to capital at reasonable terms; access to Macquarie

technical expertise resulting in benefits from "best practices" and the fact that Duquesne will remain a Pennsylvania based good corporate citizen. See Application pages 22-24.

III. OTS Position

Q. WHAT IS YOUR RECOMMENDATION TO THE COMMISSION REGARDING WHETHER OR NOT THE MERGER SHOULD BE APPROVED?

A. I recommend that the Commission not approve the acquisition by merger applications on the grounds that the associated costs far outweigh the claimed benefits.

Q. PLEASE EXPLAIN THE BASIS FOR YOUR RECOMMENDATION.

A. I have been advised by counsel that a certificate of public convenience approving a merger is not to be granted unless the Commission is able to find affirmatively that public benefit will result from the merger. Applying that standard to the instant applications, it is my professional opinion that Duquesne has overstated the importance of the claimed benefits of the merger and failed to properly identify the overriding negative effect of the proposed acquisition by merger that will result from the substantial increase in Duquesne's capital costs.

Q. WHY DO YOU CONTEND THAT THE COMPANY HAS OVERSTATED THE BENEFITS ASSOCIATED WITH THE MERGER?

A. In my professional experience analyzing mergers, one factor supporting their approval by the involved utility commission is that the entities involved can typically demonstrate a likely positive cost/benefit analysis due to the business synergies of the merging entities, often due to favorable economies of scale. Such synergies are neither demonstrated nor even alleged in the present applications. In fact, one of the Applicants witnesses readily acknowledges at page 16 of DQE Holdings LLC Statement No. 2 that synergy savings are not part of this transaction.. As to the remaining quoted "benefits," I am of the opinion that they are for the most part speculative or simply maintain the status quo. As to the proposed Economic Development Plan, the best that can be said of it is that it will benefit only a few business customers. Based upon my overall analysis of the applications, I have concluded that insufficient affirmative public benefit will result from the merger that would allow for its approval by this Commission.

Q. HOW WILL THE MERGER AFFECT THE COST OF CAPITAL?

A. Schedule No. 1 of OTS Exhibit No. 1 provided with this testimony presents the latest Standard and Poor ("S&P") research report on Duquesne's parent Duquesne Light Holdings Inc. As a review of the report discloses, the ratings on DLH and its subsidiaries including Duquesne have been placed on CreditWatch with

negative implications in response to the announced merger. S&P states that the reason for the credit watch is:

> DLH's credit measures, which now support the 'BBB' rating, will likely weaken as a result of higher debt levels post-acquisition closing.

At page 7 of DQE Holdings LLC Statement No. 2, Company Witness Leslie acknowledges that the debt ratio of DLH will increase from 57.5% to 62.5% as a result of the merger. Post merger, S&P will most likely lower the credit rating of both DLH and Duquesne Light increased financial risk resulting from the higher debt ratio. As a result of such a lower credit rating, the resultant higher cost of capital for Duquesne will be manifested in two ways. First, any new debt issues after the merger will be priced at higher interest rates which translates into a higher debt cost rate for Duquesne in future rate cases. Secondly, and typically, higher debt ratios eventually result in companies claiming a higher cost of equity in future rate cases due to an increase in risk related to the increased debt ratio. While Duquesne has not made any such claim in this proceeding, it is conceivable that such claims could be made in a future proceeding. (See page 7 of Statement DQE Holdings LLC Statement No. 2)

Q. IF FOR SOME REASON THE COMMISSION WERE TO CONSIDER APPROVING THE ACQUISITION BY MERGER APPLICATIONS, DO YOU HAVE ANY RECOMMENDATIONS AS TO CONDITIONS THAT SHOULD BE PLACED UPON THE GRANTING OF THE CERTIFICATES OF PUBLIC CONVENIENCE?

A. Yes. My primary concern regarding the results of the proposed acquisition by merger relate to the current lack of adequate financial safeguards between Duquesne and its parent DLH to ensure that Duquesne is not exposed to financial risks as a result of activities of Delhi's non-jurisdictional operations. If Duquesne were properly "ring-fenced" from DLH, the merger would have no impact on Duquesne's credit ratings thus no impact on Duquesne cost of capital.

Q. PLEASE DEFINE "RING-FENCING."

A. As a professional involved with financial analysis and the financial markets, I would state that "ring-fencing" is generally defined by the industry as techniques used to insulate the credit risk of an issuer from the risks of affiliate issuers within a corporate structure.

Q. WHAT CONDITIONS SHOULD BE PLACED UPON ANY APPROVAL OF THE APPLICATIONS TO ASSURE THAT ADEQUATE RING-FENCING WOULD BE IN PLACE FOR DUQUESNE?

A. In my professional opinion, any Commission Order approving the applications should identify and require the following *eight* conditions to adequately ring-fence Duquesne:

A. Duquesne's cost of capital used in establishing retail electric rates shall not *reflect any risk adjustment associated with its corporate parent* DLH, or any affiliate not regulated by the Commission.

B. Duquesne shall not without Commission authorization

1. Guarantee the debt or credit instruments of DLH or any affiliate not regulated by the Commission.
2. Mortgage utility assets on behalf of DLH or such affiliates.
3. Loan money or otherwise extend credit to DLH or such affiliates for a term of one year or more.

C. Duquesne shall maintain reasonable accounting controls and pricing protocols to govern transactions with affiliates, and provide the Commission, the OTS, the OCA and the OSBA reasonable access to the books, records and personnel of Duquesne's affiliates where necessary for the Commission to adequately review Duquesne's purchases of goods or services from those affiliates.

D. Duquesne shall continue to maintain separate debt.

E. Duquesne shall not be entitled to claim or receive a higher cost of capital for rate making purposes as a result of a credit rating downgrade caused by the merger.

F. Duquesne and DLH will allow the Commission unrestricted access to all written information provided to common stock, bond, or bond rating analysts, that directly, or indirectly pertains to Duquesne or any affiliate that exercises influence or control over Duquesne. This information would include reports provided to, and presentations made to, common stock analysts and bond rating analysts.

G. Duquesne will not make any distribution from common equity that would cause Duquesne's debt ratio to increase above 55 percent. All parties may re-examine this maximum threshold as financial conditions change, and may request that it be adjusted.

H. Duquesne shall ensure that DLH shall notify the Commission of any of the following:

1. An intention to transfer more than 5 percent of Duquesne's retained earnings to DLH over a six-month period, at least 60 days before such a transfer begins.

2. An intention to declare a special cash dividend from Duquesne, at least 30 days before declaring the dividend.

3. An most recent quarterly common stock cash dividend payment from Duquesne within 30 days after declaring the dividend.

Q. PLEASE EXPLAIN WHY YOU CHOSE 55 PERCENT AS A MAXIMUM DEBT RATIO IN YOUR RECOMMENDED CONDITION "G" ABOVE.

A. The guidelines published by S&P indicate that Duquesne has been assigned a business profile of 5 and a debt rating of "BBB". In order to maintain a credit rating of "BBB" S&P requires on average a 55% debt ratio for a utility with a business position of 5. See S&P Guidelines at Schedule No. 2, Response to RESA Interrogatory No. 9, p. 33.

Q. WHAT IS THE PURPOSE OF YOUR CONDITION "H" ABOVE?

A. The notification requirements for dividend payments and retained earnings transfers for Duquesne would give the Commission advance warning to a possible decline in equity thereby causing an increase in Duquesne's debt ratio.

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes.

APPENDIX A

Kevan L. Deardorff

Educational and Professional Background

I am a graduate of the Pennsylvania State University, where I received a Bachelor of Science Degree in Business Economics and Finance and a Master of Arts Degree in Economics. Before coming to the Pennsylvania PUC in 1983, I worked as a consultant for the United States Environmental Protection Agency between 1980 and 1981, and as a Research Economist for the Pennsylvania Department of Commerce during 1982.

I am currently employed as a Fixed Utility Financial Analyst III. I have completed rate of return analyses in a large number of rate cases and assisted in the analyses of many electric, gas, water and telephone rate cases. I have prepared testimony concerning rate of return, discount rate, price cap and merger benefits in the following rate cases:

Keystone Water Company	R-822211-12
	R-822215-19
	R-822221
Western Pennsylvania Water Company	R-832381
Philadelphia Suburban Water Company	R-842592
Duquesne Light Company	R-842583
Western Pennsylvania Water Company	R-842621-25
Riverton Consolidated Water Company	R-842675
Keystone Water Company	R-842755-56
	R-842759
Equitable Gas Company	R-842769
Western Pennsylvania Water Company	R-850096-97
West Penn Power Company	R-850220
Dauphin Consolidated Water Supply Co.	R-860350
Western Pennsylvania Water Company	R-860397
Philadelphia Electric Company (Gas Division)	R-870629
National Fuel Gas Distribution Corp.	R-870719
Western Pennsylvania Water Company	R-870825
Philadelphia Suburban Water Company	R-870840
Equitable Gas Company	R-880971
Chartiers Natural Gas Company	R-891283
Columbia Gas of Pennsylvania, Inc.	R-891468
Arrowhead Public Service Corp.	R-891557
Pennsylvania-American Water Co.	R-901652
Citizens Utilities Water Company of Pennsylvania	R-901663
Citizens Utilities Home Water Company	R-901664
National Fuel Gas Distribution	R-901670

York Water Company	R-901813
Columbia Gas of Pennsylvania, Inc.	R-901873
National Fuel Gas Distribution Corp.	R-911912
The Peoples Natural Gas Company	R-00922180
York Water Company	R-00922168
Pennsylvania & Southern Gas Company	R-00922312
North Penn Gas Company	R-00922276
North East Heat and Light Company	R-00922309
Shenango Valley Water Company	R-00922420
Mechanicsburg Water Company	R-00922502
National Fuel Gas Distribution Corp.	R-00932548
Roaring Creek Water Company	R-00932665
Shenango Valley Water Company	R-00932798
The Peoples Natural Gas Company	R-00932866
Blue Mountain Consolidated Water Co.	R-00932873
Allied Gas Company, et. al.	R-00932952
National Fuel Gas Distribution Corp.	R-00942991
Borough of Media Water Works	R-00943098
Newtown Artesian Water Company	R-00943157
Roaring Creek Water Company	R-00943177
Borough of Schuylkill Haven	R-00943156
Pennsylvania Power & Light Company	R-00943271
National Fuel Gas Distribution Corp.	R-00953299
Frontier Companies	P-00951005
PFG Gas, Inc. and North Penn Gas Company	R-00953524
Commonwealth Telephone Company	P-00961024
PECO Energy Company	R-00973877
PECO Energy Company	R-00973953
Pennsylvania Power & Light Company	R-00973954
Ironton Telephone Company	P-00971182
Metropolitan Edison Company	R-00974008
Pennsylvania Electric Company	R-00974009
Pennsylvania Power Company	R-00974149
PG Energy, Inc.	R-00984280
ALLTEL Pennsylvania, Inc.	P-00981423
Pennsylvania Telephone Association Small Group	P-00981425, et al
United Telephone Company of Pennsylvania	P-00981410
City of Lancaster Water Fund	R-00984567
York Water Company	R-00994605
Pittsburgh Thermal, L.P.	R-00994641
PECO Energy Company	A-110550F0147
City of Lancaster Sewer Fund	R-00005109

PG Energy	R-00005119
City of Lancaster Sewer Fund	R-00005109
PFG Gas, Inc. and North Penn Gas Company	R-00005277
Emporium Water Company	R-00005050
T.W. Phillips Gas and Oil Company	R-00005459
Verizon North, Inc.	P-00001854
Metropolitan Edison Company	P-00001860
Pennsylvania Electric Company	P-00001861
Philadelphia Gas Works	R-00006042
Pennsylvania American Water Company	R-00016339
Wellsboro Electric Company	R-00016356
Verizon Pennsylvania Inc.	R-00016683
Philadelphia Suburban Water Company	R-00016750
Philadelphia Gas Works – Extraordinary Rate Relief	R-00017034F
Verizon Pennsylvania Inc.	P-00930715F0002
The York Water Company	R-00027975
National Fuel Gas Distribution Corp.	R-00038168
Pennsylvania American Water Company	R-00038304
Aqua Pennsylvania, Inc.	R-00038805
Duquesne Light Company	P-00032071
PPL Electric Utilities Corporation	R-00049255
Valley Energy Inc.	R-00049345
Wellsboro Electric Company	R-00049313
National Fuel Gas Distribution Corporation	R-00049656
Pike County Light & Power Company	R-00049884
Township of Falls – Sewer Fund	R-00049557
PECO Energy Company	A-110550F016
MESCO, Inc.	R-00050678
Aqua Pennsylvania, Inc.	R-00051030
United Water Pennsylvania, Inc.	R-00051186
Metropolitan Edison Company	R-00061366
Pennsylvania Electric Company	R-00061367
PG Energy	R-00061365
PPL Gas Utilities Corporation	R-00061398

OTS Statement No. 1-SR
Witness: Kevan Deardorff

APPLICATION OF DUQUESNE LIGHT COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE UNDER SECTION 1102(A)(3) OF THE PUBLIC *UTILITY CODE APPROVING THE ACQUISITION OF DUQUESNE LIGHT* HOLDING, INC. BY MERGER
DOCKET NO. A-110510F0035

APPLICATION OF DQE COMMUNICATIONS NETWORK SERVICES LLC FOR A CERTIFICATE OF PUBLIC CONVENIENCE UNDER SECTION *1102(A)(3) OF THE PUBLIC UTILITY CODE APPROVING THE ACQUISITION* OF DUQUESNE LIGHT HOLDING, INC. BY MERGER
DOCKET NO. A-311233F0002

Surrebuttal Testimony

of

Kevan Deardorff

Office of Trial Staff

Concerning:

OTS Response to Duquesne Light Company
Witness Christopher J. Leslie's Rebuttal Testimony
Duquesne Statement No. 2-R

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Kevan L. Deardorff. My business address is Pennsylvania Public Utility Commission, P.O. Box 3265, Harrisburg, Pa. 17105-3265.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN THIS PROCEEDING?

A. Yes, I have. My direct testimony and exhibit on behalf of the Office of Trial Staff ("OTS") were distributed to the presiding Administrative Law Judge and active parties earlier in this proceeding. See: OTS St. No. 1 and OTS Ex. No. 1.

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of Duquesne Light Company ("Duquesne") Witness Christopher J. Leslie, identified as Duquesne St. 2R.

Q. PLEASE IDENTIFY THE ISSUES ADDRESSED IN THIS TESTIMONY.

A. In his rebuttal testimony, Duquesne Witness Leslie addresses the eight conditions that I recommend in my direct testimony be placed upon any granting of the certificates of public convenience in the event the Commission considers approving the present acquisition by merger applications. See: Duquesne St. 2R, pp. 10-12 and OTS St. 1, pp. 7-9. Of these eight conditions, Mr. Leslie on behalf of Duquesne accepted six of my recommended conditions, modified one condition

and outright rejected the remaining condition. See: Duquesne St. 2R, pp. 10-12 and OTS St. 1, pp. 7-9.

Q. WHICH OF YOUR RECOMMENDED CONDITIONS DID DUQUESNE WITNESS LESLIE MODIFY?

A. Mr. Leslie proposes to modify my recommended condition that the Commission provide in any Order approving the merger applications that Duquesne's long-term debt ratio as a percent of total capitalization not exceed 55%. Mr. Leslie proposes to increase this threshold to 60% and have that threshold in effect for a period of three (3) years. See: Duquesne St. 2R, p. 11 and OTS St. 1, p. 8.

Q. WHAT IS YOUR RESPONSE TO THE 60% THRESHOLD MODIFICATION MADE BY DUQUESNE WITNESS LESLIE?

A. Given the dearth of evidence in the presently-filed applications demonstrating that the proposed acquisitions provide an affirmative public benefit, it is the OTS position that this modification is unacceptable. In my professional opinion, the 60% threshold is at the top end of the S&P range of 50-60% debt ratio in order to maintain a "BBB" rating and in fact, the mere maintenance of such a debt ratio of 60% does not even guarantee a "BBB" rating. For example, Duquesne's other financial criteria may be deemed marginal by credit rating agencies and may even provide justification for a down-grade to "BB" – which is "junk bond" status.

Again, given the present lack of evidentiary support for the granting of the applications and given the fact that all eight of the "ring-fencing" provisions I have recommended have not been adopted by the Applicants, I would therefore presently reject the establishment of a 60% threshold and continue to recommend a 55% debt ratio as appropriate because it provides a margin of error for Duquesne to at least maintain its current credit rating.

Q. WHAT IS YOUR RESPONSE TO DUQUESNE WITNESS LESLIE'S SECOND MODIFICATION TO YOUR THRESHOLD TO LIMIT IT TO A THREE (3) YEAR TERM?

A. I also reject this modification as inappropriate and essentially meaningless. I am of the opinion that no such term limits are appropriate because if the merger is approved, Duquesne's exposure to the credit risks associated with the activities of its new corporate parent's non-jurisdictional operations will be ongoing. As such, even after a period of three (3) years have elapsed, credit agencies such as Standard & Poors ("S&P") will continue to evaluate how well Duquesne is financially insulated from the risks associated with its corporate parent(s). If such financial insulation such as the threshold I recommend are not in effect indefinitely, such "ring-fencing" that protect Duquesne's credit rating will disappear when Mr. Leslie's recommended period has elapsed and Duquesne will then immediately be subject to potential downgrading of its credit rating.

Q. WHICH OF YOUR RECOMMENDED CONDITIONS DID DUQUESNE WITNESS LESLIE REJECT?

A. At page 8 of my direct testimony, I recommend three dividend reporting requirements. At page 12 of his rebuttal testimony, Mr. Leslie provides his opinion that the dividend reporting requirements that I proposed are not necessary because dividends are already reported in annual reports and that the condition that the long-term debt ratio not exceed 60% without Commission approval would be an effective limitation on dividends. He also states that I did not provide any compelling reason why further requirements are required. See: Duquesne St. 2R, p. 12.

Q. DO YOU AGREE WITH DUQUESNE WITNESS LESLIE'S OPINION AND HIS REJECTION OF YOUR REPORTING REQUIREMENT CONDITION FOR CASH DIVIDEND PAYOUTS?

A. No. At page 9 of my direct testimony, I clearly explained that this requirement would give the Commission advance warning to the distribution of a cash dividend to shareholders, i.e. Duquesne's corporate parents, that could result in a decline in equity. This decline in equity is detrimental to Duquesne because the debt ratio could be increased over the threshold. As such, Duquesne Witness Leslie's assertion at page 12 of his rebuttal testimony that the fact that such dividends are identified in the annual report to the Commission is after the fact and would

provide none of the benefits that exist for my recommended condition that advance notice be provided to the Commission.

Q. IN HIS REBUTTAL TESTIMONY, MR. LESLIE ALSO STATED THAT A LONG-TERM DEBT RATIO THRESHOLD WOULD BE AN EFFECTIVE LIMITATION ON DIVIDENDS. DO YOU AGREE?

A. No. I would emphasize that any such threshold pertains only to new debt issuances and has no relationship or governance over dividend payouts. As such, no threshold would provide the Commission with the necessary advance warning of an impending cash dividend payout that would adversely affect Duquesne's debt ratio.

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes.

COMMUNITY ACTION ASSOCIATION OF PENNSYLVANIA

CAAP Statement No. 1

Direct Testimony of John A. Wilson

In the Matters Of: Application of Duquesne Light Company for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger
Docket No. A-110150F0035

Application of DQE Communications Network Services LLC for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger
Docket No. A-311233F0002

Q: Please state your name, title, and business address.

A: My name is John A. Wilson, Executive Director, Community Action Association of Pennsylvania, 222 Pine Street, Harrisburg, PA 17101.

Q: *On whose behalf are you testifying?*

A: The Community Action Association of Pennsylvania (CAAP), a statewide association of local Community Action Agencies in Pennsylvania.

Q: What is your relevant experience in this case before the Commission?

A: CAAP's membership covers each of the counties in the Company's (DLC) service territory. CAAP has been incorporated for more than 20 years and, as an integral part of its mission, has advocated for the low-income population of Pennsylvania. I have been the Executive Director of this agency for 13 years. Prior to that, I was Executive Director of the Community Action Program Southwest for 14 years, serving Washington and Greene Counties. On a statewide level, I have served on the Department of Public Welfare Homeless Advisory Council, LIHEAP Advisory Council, and the Community Service Block Grant Task Force. I also serve on several other local and National Boards in similar capacities. On behalf of our member agencies, CAAP has intervened in numerous rate and restructuring cases before the PUC.

Q. What is the purpose of your testimony is this case?

A. It is part of our responsibility to our constituency to advocate for their interests in regulatory proceedings. Our member agencies provide a wide range of services to Pennsylvania's low income population including helping them manage their rising utility costs. CAAP is intervening in this case, and has intervened in prior utility regulatory matters, to address the adequacy of a company's universal service programs and to address the affordability of transmission and distribution rates. Pursuant to that advocacy, CAAP intervened in DLC's restructuring proceeding (R-00974104) and it's most recent rate case (R-00061346).

Q. What are your general concerns in this case?

A. In general, I am concerned with the effect of foreign ownership on ratepayers and in particular the resulting company's commitment to universal service programs and its low income customers. Ownership of DLC will move further away from Western Pennsylvania with ownership being in the hands of the Macquarie Consortium, a group of investment funds managed by Macquarie Bank Limited which is headquartered in Australia. I believe that as ownership moves further away the much needed connection to the local community becomes lost. I understand that DLC may remain a presence in Western Pennsylvania but the ultimate decision making authority will be far removed from the area. And I am concerned about the resulting company's commitment to the local community and in particular it's low income customers.

As an example, the Applicants have proposed an Economic Development Plan whereby industrial users will receive reduced price offerings with those price offerings creating new jobs. I will leave it to others to argue whether such a program is in the best interests of ratepayers but I will say that the Applicants have not set forth any proposal in their application that will benefit low-income customers. In fact, in their discovery responses, the Applicants have stated that they propose no change, no increased funding and no improvements to their universal service programs.

Q: What were your concerns in Duquesne's recent distribution rate case regarding universal service programs?

A. My testimony in Duquesne's rate case mainly addressed the Company's low-income usage reduction program, Smart Comfort. And through a settlement of that case Duquesne agreed to increase funding for its Smart Comfort program from $1,181,000 annually to $1,531,000 annually. The Commission has long recognized the benefits of a well funded LIURP program and Duquesne should be commended for agreeing to that increase. But my testimony in the rate case also addressed the need for the company to use local, community based organizations in the design and implementation of its universal service programs. That issue was left unresolved by the settlement is of greater concern because of the proposed overseas ownership.

Q. What were your concerns in the rate case concerning DLC's use of local community based organizations?

A. I was concerned with the extent to which the Company uses local community based organizations that deal with low income consumers relative to a wide range of financial difficulties faced by those low income consumers. The Company's LIURP program is administered by a single entity, Conservation Consultants, Inc. (CCI). CCI's mission is to provide energy consulting services to the consumer and is limited to basically providing energy saving education and energy audits. There was nothing in the Company's discovery responses in the rate case to indicate that CCI provides any weatherization services. Because CCI's mission is limited to energy saving education and energy audits, it does not serve low income consumers on a broad range of issues. Utilizing more than one contractor or seeking the advice of additional weatherization providers for the LIURP Program would enhance the program by enabling greater input into program design, a wider variety of measures, improved techniques and enhanced energy savings.

We have found that when a low income consumer comes to a social service agency he or she usually has a wide range of financial difficulties; not only would a low income consumer have difficulty in paying his or her utility bills but also may have problems with other financial obligations. Because community action agencies serve low income consumers on a broad range of issues facing those consumers, they would be better able to provide resources that would address that consumer's financial difficulties and not just

energy related difficulties. These organizations serve thousands of low income and disadvantaged members of the community; they have direct knowledge of the barriers and impediments to self-sufficiency, and continually innovate and evolve the service delivery system to better meet the needs of the population they serve. The focus and experience of community based organizations make them singularly suited to speak for the needs of the community.

Q. Do you have any suggestions relative to the Company's use of community based organizations?

A. Yes. I am proposing that the Company employ the community action agency network and the Pennsylvania weatherization providers' network in administering its universal service programs. As indicated above, CCI serves low income consumers only relative to energy education and audits while community action agencies serve low income consumers with a broad range of services. Also, this Company historically has a low cost per job for LIURP which indicates that the Company is not providing much in the way of weatherization services under its LIURP program and it is my belief that using the Pennsylvania weatherization providers network will better able the Company to provide those weatherization services.

And I also believe that CAAP and the Pennsylvania weatherization providers' network should be involved in the development and implementation of the resulting company's universal programs.

Q. How would the resulting company involve those parties?

A. By providing CAAP and the weatherization providers' network with an opportunity to participate in the submission in the company's next, and future, Universal Service and Energy Conservation Plans. That plan is due to be submitted in February of 2007 and the company should engage in meaningful discussion with CAAP and the weatherization providers network in the development of that plan and those parties should be given an opportunity to submit comments regarding that plan to the Commission. This input should not limited to the submission of the next plan but should continue going forward.

Q. Are there any other opportunities to involve those parties in the Company's universal service programs?

A. Yes. The Company acknowledged in its 2004-2007 Universal Service and Energy Conservation Plan the following:

"Pittsburgh area has dwellings in great need of energy conservation measure. Many have gas furnaces installed, but which have been shut-off for maintenance reasons. This forces residents of these dwellings to use costly electric space heaters to stay warm. Use of these heaters drives up their energy bills, but alleviating the situation cannot be simply addressed through traditional LIURP means.

Duquesne plans to work with the Universal Service personnel of area gas companies to seek means by which the companies can jointly address the conservation and reduction needs of housing described above."

(DLC Universal Service and Energy Conservation Plan, 2004-2007, p. 21).

In its discovery responses DLC has stated that it is working with the area's natural gas company, Dominion Peoples, to address the above by providing low income customers with weatherization/insulation and furnace assistance services. CAAP and the Pennsylvania weatherization providers' network should be involved in that partnership because of their experience in helping low-income customers and because of their experience in providing weatherization services. Those parties can partner with the Company in the development and implementation of that program and help meet the Company identified need for weatherization services.

Q. Do you have any other concerns regarding this case?

A. Yes. I applaud the Company for the level of its charitable giving, approximately $2.5M in 2005 and nearly $3.0M in 2006, but very little of those dollars went to non-profits that provide energy conservation measures or other aid to low-income customers. The Company's charitable giving to such non-profits amounted to less than 1% of its charitable giving for both 2005 and 2006. And no money was provided to the local community action agencies. In a time when many say that private companies and individuals, and not the government, should be involved in charitable endeavors, I would

like to see agencies that help the Company's low-income customers receive a greater share its charitable giving.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Duquesne Light Company for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger	:	Docket No. A-110150F0035
Application of DQE Communications Network Services LLC for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger	:	Docket No. A-311233F0002

CERTIFICATE OF SERVICE

The undersigned hereby certifies that he served a copy of the Community Action Association of Pennsylvania Statement No. 1, Direct Testimony of John A. Wilson upon the following participants this 21st day of December, 2006, via first-class mail and electronic mail:

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DIRECT TESTIMONY

OF

DAVID HUGHES

ON BEHALF OF CITIZEN POWER, INC.

DECEMBER 21, 2006

Q. Please identify yourself for the record.

A. My name is David Hughes. I am the Executive Director of Citizen Power, Inc. My business address is 2121 Murray Avenue, Pittsburgh, PA 15217.

Q. *Please summarize your qualifications and experience.*

A. I have a Masters in Education from the University of Pittsburgh and three years of postmasters study in political communication and media studies. I have worked as a public advocate on utility issues for 20 years, the last 10 years as the Executive Director of Citizen Power, an energy advocacy organization. In that capacity I have been involved in numerous utility proceedings before regulatory commissions, including the Pennsylvania Public Utility Commission. Citizen Power advocates for protections for low-income customers and the environment.

Q. Have you previously offered testimony before this Commission?

A. Yes, I filed testimony in the 1987 Duquesne Light Company ("Duquesne") base rate proceeding, Docket No. R-870651 and in the 1997 Duquesne restructuring proceeding, Docket No. R-00974104.

Q. Has Citizen Power participated in merger proceedings before this Commission?

A. Yes, Citizen Power was a party to the FirstEnergy-GPU merger proceeding in Docket No. A-110300F0095, *et al.* and the Allegheny Energy-Duquesne merger proceedings in Docket No. A-110150F0015.

Q. What is the purpose of your testimony?

A. This case involves an application by Duquesne and its affiliate DQE Communications Network Services LLC ("DQE") for all necessary approvals from the Commission authorizing the transfer of control of their parent company,

Duquesne Light Holdings, Inc. ("DLH"), which will be acquired (through a holding company) by the Macquarie Consortium. I will refer to Duquesne and DQE as the "Applicants."

The purpose of my testimony is to offer my opinion regarding whether Applicants have demonstrated that the proposed merger will affirmatively benefit the public interest in some substantial way, as required under Pennsylvania law. Because I conclude that Applicants have not met this burden, I recommend several proposed conditions that, in my opinion, should be met if the Commission is to approve the merger. In particular, Applicants have stated that: "[T]he Macquarie Consortium and Duquesne share a strong commitment to customers, the environment and to the communities in which they provide service." Application at 22. My testimony describes how the Applicants can fulfill the above stated commitment and ensure that the proposed merger provides substantial affirmative benefits to customers, particularly low income customers, and the environment.

Q. Please summarize your conclusions.

A. I conclude that Applicants have not met their burden to show that the proposed merger will affirmatively benefit the public interest in some substantial way, and the Commission should only approve the transaction subject to my recommended conditions, which will help ensure that the merger provides affirmative benefits.

Q. What specifically do you recommend?

A. I recommend that Duquesne and Macquarie should be required to abide by conditions that implement their professed commitment to the people and the

environment in western Pennsylvania. Specifically, I recommend that Duquesne be required to: (1) implement a solar energy initiative with two components, (a) formal evaluation of the feasibility of a "utility-driven" investment in solar power and (b) funding for a program similar to the successful "customer-driven" photovoltaic ("PV") program in the PECO service territory; (2) expand its existing Low Income Usage Reduction Program ("LIURP"); and (3) implement a separate LIURP initiative that provides assistance to low-income customers not eligible for Duquesne's existing LIURP.

Q. You indicated that you have concluded that Applicants have not shown that the proposed merger will provide substantial affirmative benefits to the public. Please elaborate.

A. The overall thrust of the Applicants' arguments in support of merger approval is that the transaction would be beneficial because it would preserve the status quo. Applicants suggest, for instance, that Duquesne would remain a Pittsburgh-based company and would continue with Duquesne's existing programs, such as the infrastructure improvement plan. Application at 22-25. Further, Applicants have indicated in discovery that they are not proposing any increased funding or other changes to universal service programs in connection with the merger. By definition, however, preserving the status quo does not provide substantial *affirmative* benefits. Although the Application refers to improved access to capital and sharing of best practices, the Applicants do not quantify these alleged benefits or explain why a merger is required to become acquainted with "best practices." The Applicants do not even expect that there will be any synergy

savings generated by the merger that might flow to customers. Application at 16. Thus, my conclusion is that the Applicants have not shown that the merger, as proposed, will provide substantial affirmative public benefits.

I would note that there is no question that the merger will benefit the *private* interests of Duquesne's shareholders, since, according to the Application, the merger consideration of $20.00 per share in cash represents a 21.7% premium over DLH's pre-merger announcement closing share price. Application at 13.

Q. Do you believe that the Commission could impose conditions on the proposed merger that would allow the transaction to satisfy the substantial affirmative benefits test?

A. Yes. Rather than recommend that the Commission reject the merger outright, I have attempted to formulate several conditions that, if adopted by the Commission, would support approval of the merger. I would note that, standing alone, the conditions I recommend would not necessarily allow the merger to meet the substantial affirmative benefits standard, and other parties may propose additional conditions that the Commission may need to adopt if the merger is to be approved. My position is that the conditions I recommend must be adopted in order for the merger to be approved because they are instrumental in fulfilling the commitment to customers and to the environment that Duquesne and Macquarie have described in their Application.

Q. Please elaborate on your observation that Duquesne and Macquarie have professed a commitment to customers and the environment.

A. As noted above, the Applicants assert that "the Macquarie Consortium and Duquesne share a strong commitment to customers, the environment and to the communities in which they provide service." Application at 22. Further, Christopher J. Leslie, the CEO of Macquarie Infrastructure Partners, states in his testimony that "[r]ecognizing that the infrastructure investments it manages involve both environmental and societal responsibilities, the Macquarie Group and the Macquarie Consortium, like DLH and Duquesne Light, understand the importance of its role as a responsible corporate citizen." Statement 2 at 13. Applicants also maintain that Duquesne has "aggressively pursued programs to assist its low income customers who are having difficulty paying bills for electric service." Application at 8. Further, Applicants state that "the Macquarie Consortium is committed to pursuing new and existing strategic initiatives with Duquesne's current management to further improve ratepayer satisfaction and continue to focus on product quality and operational efficiency." Application at 22-23.

Although these comments are somewhat encouraging, my opinion is that, without any type of specific obligations, the Applicants' professed mutual commitment to the environment and to customers (low-income customers in particular) is largely aspirational. If Applicants are going to cite a shared commitment to the environment and customers as a basis for approving the merger, Duquesne and its prospective new owners should back up their professed commitments to the environment and local communities with tangible support for

new or expanded renewable energy and low-income programs that will provide substantial affirmative benefits.

Q. You stated that one of your recommendations is that Duquesne evaluate a utility-driven solar energy program. Please elaborate.

A. In referring to a "utility-driven" solar energy program, I mean a program where Duquesne itself would own photovoltaic facilities installed throughout its service territory. In this regard, Duquesne has obligations in connection with the Pennsylvania Alternative Energy Portfolio Standards Act (Act 213). A utility-driven solar energy program can be an effective least-cost strategy to meet Act 213 goals. Significant savings may be achieved by locating solar arrays at or near electric load, utilizing customer facilities, *i.e.,* distributed PV facilities ("DPV"). The benefits of DPV are proportionate to the design and scale of the system, and how well it is managed to meet utility peak demand. I have attached as Exhibit DH-1 a paper prepared by ElectricSUN which provides further background on the potential benefits of a utility-driven solar program. ElectricSUN is a company specializing in collaborating with utilities and other stakeholders to enhance the market for profitable, utility-driven solar resource development. As described in the paper, the cost range for a typical PV installation is $5,500 to $ 6,000 per kW. Total company outlays depend on the system design and number of facilities available for installations.

I recommend that, as a condition of merger approval, Duquesne be required to formally evaluate the potential benefits of implementing a DPV program in its service territory, including whether such a program is likely to be a

cost-effective approach to complying with Act 213. Duquesne should be required to consult with other parties to this proceeding, including Citizen Power, regarding the process to be used in performing this evaluation. Preferably, Duquesne should engage an outside expert (such as ElectricSUN) to assist in the evaluation. Duquesne should be required to file a report with the Commission describing the results of this evaluation within 90 days of a Commission order approving the merger subject to this condition. The report would be subject to public comment. If, after review of the report and comments, the Commission concludes that a DPV program would be a cost-effective approach to complying with Act 213, Duquesne would be required, as a condition of the merger approval, to implement such a program.

Q. You also identified a customer-driven solar energy program. Please explain how you envision this program working.

A. By "customer-driven," I mean a program where customers would own PV facilities and share in the benefits of such facilities. A benefit of the proposed merger should be a contribution by Macquarie and Duquesne to the effort to build a clean, diversified and sustainable energy future for Pennsylvania. Advances in solar energy technology provide just such an opportunity. Accordingly, I recommend that Duquesne fund a solar grant program similar to the one in place in the PECO service territory. Celentano Energy Services ("CES") administers the solar energy program on behalf of the PECO area Sustainable Development Fund. As of December 2006, 170 installations have been completed. The Solar PV systems capacity ranges from 1kW to 5 kW for residential installations and 1

kW to 10 kW for commercial installations. The program is performance-based and requires the installation of two unidirectional, AMR meters that can measure solar production and determine the performance incentive. I have attached as Exhibit DH-2 a detailed description of the PECO area solar energy program prepared by the program administrator. (Note that this description was written in early March 2005 and presented to the American Solar Energy Society's Solar 2005 conference).

Q. How do you recommend this customer-driven solar program be funded?

A. The PECO territory solar program was financed by a $4 million grant, funded by shareholders, which was agreed to as part of the settlement resolving the PECO/Unicom merger proceeding before the Commission in 2000. However, the program administrator has informed me that this level of funding has been insufficient, and while the funding has been exhausted, there are still many applications pending. I recommend that Applicants commit to a funding level that would allow a comparable number of installations to be done in the Duquesne service territory. This would require a comparable amount of funding, or $4 million, for what I will call the Duquesne Light Company Solar Initiative. As in the case of PECO/Unicom, this $4 million amount would be shareholder funded, and would not be passed through to customers in rates. Given the smaller size of Duquesne's customer base relative to PECO, this level of funding should ensure that a significant number of installations will be done without a backlog of pending applications that never receive attention. I recommend that Duquesne select a qualified administrator to manage this solar energy initiative.

Q. Why are you recommending expansion of the existing LIURP?

A. Duquesne currently applies three eligibility criteria for the LIURP program: (1) the customer must be at or below 150% of the poverty level; (2) the customer must be "payment troubled;" and (3) the customer must use at least 500 kW per month. In the 2004 Universal Service Plan Duquesne submitted to the PUC, the Company estimated (p. 22) that, at the beginning of 2004, there were 33,689 customers eligible for LIURP. Accepting that number, since then, 8,455 customers have participated in the program (DLC response to CP interrogatory Set III, No. 13). Assuming no increase in the total eligibility number, 25,234 customers continue to be eligible. As per the settlement in PUC Docket No. 00061346, Duquesne plans on providing LIURP services to up to an additional 2,250 customers in 2007. Again, assuming no increase in the total eligibility number, 22,984 customers will still need LIURP services by the beginning of 2008. Continuing to wait for LIURP services means having to pay unnecessarily high bills. Citizen Power believes that one way for Duquesne and Macquarie to demonstrate their "strong commitment" to their most vulnerable customers, and to the environment, is to ramp up the existing LIURP. Citizen Power strongly supports the notion that all eligible customers receive LIURP as soon as possible. Accordingly, I recommend that Duquesne commit to increasing the number of customers serviced to 4,000 a year. This represents approximately a 700 customer per year increase over the 2006 participant level. Any funding beyond the current LIURP funding level included in distribution rates (including carryover amounts) needed to meet these targets would be funded by shareholders. Accepting the $675 per job number referenced in Michele Sandoe's

Statement No. 13-R in Docket No. R-00061346, I estimate that yearly LIURP funding (not including carryover amounts) would need to increase from $1,531,000 (included in the R-00061346 settlement) to $2,700,000.

Q. **Please describe the new LIURP initiative you are recommending.**

According to the "needs assessment" conducted by Duquesne Light as part of the Company's 2004 Universal Service Plan, there are an estimated 99,747 Duquesne customers that fall below 150% of the poverty line (Response to CP Interrogatory Set 1, No. 4). Between 2001 and 2006, Duquesne's current LIURP program provided services to an average of about 2,400 customers per year, and most of these customers were "payment troubled," referred to LIURP through an internal process. In other words, there are thousands of customers who would otherwise be eligible for LIURP except that they are paying their bills on schedule. These customers are generally referred to as the "working poor." It is clear that there is a need for LIURP services much greater than what is being provided. Citizen Power recommends that Duquesne offer a new and separate LIURP for customers who do not meet the existing LIURP eligibility guidelines, who have income at 250% of the poverty level, and who are not payment troubled. I call this new program the Home Energy Savings Program ("HESP").

Q. Is there any precedent for a program like HESP being offered?

A. Yes. In 2002 Citizen Power conducted just such a program for nearly 700 customers of West Penn Power. These customers had income 200% or below the poverty line and were not eligible for West Penn's LIURP.

Q. How many customers do you recommend be served by the HESP and how do you propose the HESP be funded?

A. I recommend that the HESP be made available to the same number of customers I recommended be served in the existing LIURP for the years 2008 through 2010, or 4,000 customers a year. I also recommend the same funding level of $2,700,000 per year from shareholder funds.

Q. Please summarize your conclusions and recommendations.

A. Applicants have not met their burden to show that the proposed merger will affirmatively benefit the public interest in some substantial way, and the Commission should only approve the transaction subject to my recommended conditions, which will help ensure that the merger provides affirmative benefits. If Applicants are going to cite a shared commitment to the environment and customers as a basis for approving the merger, Duquesne and its prospective new owners must back up their professed commitments to the environment and local communities with tangible support for new or expanded renewable energy and low-income programs that will provide substantial affirmative benefits.

Specifically, the merger should be conditioned upon Duquesne: (1) implementing a solar energy initiative with two components, (a) formal evaluation of a utility-driven investment in solar power and (b) a program similar to the successful customer-driven PV program in the PECO service territory; (2) expanding Duquesne's existing LIURP; and (3) implementing a separate LIURP initiative that provides assistance to low-income customers not eligible for Duquesne's existing LIURP.

Q. Does this conclude your testimony?

A. Yes it does.

EXHIBIT DH-1

From the Forthcoming ASES Solar 2006 Conference

UTILITY-DRIVEN SOLAR ENERGY AS A LEAST-COST STRATEGY TO MEET RPS POLICY GOALS AND OPEN NEW MARKETS

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ABSTRACT

This paper demonstrates how utilities can develop and own distributed photovoltaic (DPV) resources to meet their renewable portfolio standard requirements. DPV resources produce valuable savings in generation, transmission and distribution peak demand, and create risk management and business benefits, all of which are internal to utility economics. These benefits can be maximized if the utility takes the lead in locating the DPV resource where, when and at the scale it is needed, and in designing and managing it to meet utility peak demands. A surprising conclusion from this analysis is that utility-driven DPV resources often save more than they cost, and may be less expensive than central station renewables. Utility-driven DPV may be the least-cost choice for utilities that have renewable energy generation requirements under their state's Renewable Portfolio Standard (RPS). As policymakers and utilities understand this strategy, opportunities increase for reaching higher RPS goals and diversifying utility portfolios.

1. INTRODUCTION

Currently, 21 states and the District of Columbia have Renewable Portfolio Standards (RPS). Affected utilities must supply an increasing percentage of their retail energy needs each year with qualifying renewable energy resources and account for these resources with renewable energy credits (RECs). By 2020, RPS rules are expected to trigger development of more than 50 GW of renewable energy capacity nationwide, and this estimate is growing as more states set RPS goals every year. A 10 percent national RPS, which gained U.S. Senate approval in 2005, would push renewables development to 130 GW by 2020, according to Global Energy Advisors.

To date, solar energy has played a very small role in achieving RPS goals. Some states have included solar photovoltaic (PV) set-aside provisions (Arizona, Colorado, New Jersey, New York, Pennsylvania, and DC all aiming for less than 1%; Nevada seeking 5%), and a few indirectly promote solar. The purpose of RPS solar set-asides, from the legislators' perspective, is to diversify the utility portfolio, based on an understanding that wind is the dominant renewable, and that solar is the most expensive and least likely to be included without extra effort.

Some state RPS programs, for example New Jersey and Pennsylvania, provide for utilities to buy high-value RECs from customers that own PV systems, in effect creating a performance-based retail solar incentive. New Jersey solar RECs averaged $200/MWh from August 2004-2005, and are capped at $300/MWh. The solar REC market in Pennsylvania is untested, but REC values there reportedly may rise to the $600/MWh cap. All told, RPS policymakers who want to see solar at all on the resource radar screen expect utilities (and ratepayers) to pay well.

In this paper we describe a utility-driven, solar energy development business model in which utilities directly own distributed photovoltaic (DPV) systems on and adjacent to their customer's facilities. Locating DPV resources at the electric load produces significant peak-demand related savings in generation, transmission and distribution, as well as risk management and business benefits that are internal to utilities' economics. These benefits can be maximized if the utility takes the lead in locating the DPV resource where, when and at the scale it is needed, and in designing and managing it to meet utility peak demands.

A surprising conclusion from this analysis is that utility-driven DPV resources will be the least-cost resource to meet RPS requirements for some utilities. If DPV resources can save more than they cost, then they are inherently less expensive than most wind resources and many other central station renewables. This is because, despite their other unique benefits, central station renewables do not have the beneficial effects on peak capacity investments throughout the utility system that well-managed distributed resources can produce. Utilities that implement this strategy can minimize the cost of RPS compliance, manage disruptive technology risk, reduce costs and rates and, if regulators approve, improve returns to utility shareholders.

The utility-driven DPV strategy will be useful first in states that have robust solar REC markets. We believe that as the solar industry matures utility DPV will be a least-cost RPS option for many utilities nationwide. As utilities gain experience accounting for the many benefits of distributed resources, DPV could well become a leading least-cost peak and intermediate capacity resource for non-RPS jurisdictions as well.

We conclude that if DPV is to play a strong role in solving the critical problems that drive RPS policies, from climate recovery to energy security, then industry leaders and policymakers must tap the readiness and reach of the utility market channel. If this utility-solar strategy is successful, it can stimulate growth of a new and potentially very large market for solar technology.

2. UTILITY-DRIVEN DISTRIBUTED PV BUSINESS MODEL

Utilities meet their RPS requirements by purchasing RECs from customers with solar energy systems or from third parties in the REC market. Direct utility investment in solar energy is an alternative to utilities buying RPS compliance RECs. This paper focuses on the benefits of utility investments in and ownership of *distributed* PV energy and capacity resources, as contrasted with centralized PV or concentrating solar power systems.

2.1 Overview

In our utility-driven DPV business model the utility's objective is to maximize the economic value of its solar energy investment, which then minimizes the cost of RPS compliance. DPV can reduce, defer or avoid costs in utility capital and operating budgets. Valuable savings are associated with peak-demand management that DPV can produce in generation, transmission and distribution systems. Further, DPV can be a potent risk management strategy, addressing a wide range of financial, technical, economic, regulatory, insurance, political, fiduciary, and market risks. It can build customer relationships and preserve the utility revenue stream.

To optimize cost-savings related to peak demand, the utility would locate the DPV resources as near to end-use electric loads as possible, for example, on or adjacent to buildings, municipal water pumping stations, substations, etc. If carefully planned and implemented, this would help to defer substation construction, reduce maintenance, line losses, and transmission congestion, provide voltage and reactive power support, and improve grid reliability.

One key to a successful utility strategy is to design DPV for a high effective load carrying capacity (ELCC). This means that the solar resource would predictably have a high probability to serve the peak demand on the generation, transmission and/or distribution system. Design for ELCC criteria include:

- Location – where DPV can address grid problems
- Scale – match DPV resource to grid requirement
- Timing – build in time to effect change in traditional investment
- Orientation – match DPV resource output to grid or generation peak demand
- Maintenance – assure resource performance over time
- Integrate with dispatchable load management (direct load control, also known as demand response) and/or local energy storage

DPV systems can have nearly 100 percent ELCC if they are combined with either local energy storage or load management capability.[1] A study of utility-scale solar load control opportunities for the Sacramento Municipal Utility District is one of several such studies that have found synergistic effects of integrating these technologies. "Operating PV (representing a 10 percent peak reduction) in tandem with an existing Direct Load Control (DLC) capability could "stretch" the dispatchable capacity of the DLC pool ... by doubling the DLC instantaneous dispatchable capacity ... (while imposing) considerably less cumulative impact on the customers (than DLC alone)." A 20 percent utility peak load reduction could be achieved with PV and just 12.4 hours of load control per year, compared to about 63 hours per year without PV. In this case, load control would virtually stretch the effective on-peak solar resource from 211 to 532 MW.[2]

2.2 Analysis of Utility Costs and Benefits

Utility analysts traditionally compare the busbar costs of various alternatives when they consider investments in new generation. That is, what is the cost per kWh at the output terminals of the generator? The comparison always results in PV being ranked as the most expensive generation alternative. Relatively low-cost coal plant busbar costs may

be around 5 cents and PV may be 25 or 30 cents per kWh; most other generation alternatives, including wind, are clustered near the lower end of this range. The capital cost per kW may also be compared; natural gas-fired plants enjoy a 10 or 15 to one cost advantage over PV resources. Wind capital costs are 3 to 6 times cheaper than PV.

A completely different result is obtained by analyzing the *net resource cost* of DPV resources located on or near buildings where the power and grid support is needed. By locating at the load, DPV can change many aspects of the utility's economics from the load all the way back through the distribution, transmission and generation system. These beneficial effects of distributed resources may be worth enough in some (perhaps many) cases to tip investment decisions away from central-station fossil or remote wind to DPV resources.

To test the extent to which savings in traditional utility capital and operating costs can substantially change the economics of the DPV resource, we calculated the present value of utility-driven DPV benefits and costs from the perspective of a generic Northeastern utility, using estimates of a subset of terms drawn from Tables 1-3 below, including:

- Natural gas to run peak and intermediate power plants
- Peak generation capacity and O&M
- Distribution investment deferral
- Transmission congestion relief
- Environmental (nitrogen oxide controls)
- Line losses
- Avoided REC payments
- Retained customer revenue

The net present value of the utility benefit from owning DPV capacity was in excess of $6,000 per kW. We would expect similar results for many utilities throughout the U.S. Of course, each utility's system must be analyzed based on its technical details, policy environment, risk profile and economic circumstances.

Where DPV resources *save* more than they cost, they are *inherently* less expensive than most wind or other remote central station renewables. While a variety of renewable energy investments are advised in any utility energy resource portfolio, in this light, DPV has an edge.

The conclusion from this analysis is that utility owned DPV resources could be a least-cost resource to meet RPS requirements. And the analysis is conservative; we did not quantify values associated with risk management or the significant other terms listed in Tables 1-3. These additional values are potentially enormous.

2.3 Contrast with Customer-Driven PV

We compared the utility-driven DPV results with the traditional customer incentive-driven business model. In the customer-driven case the utility benefit was about $3500/kW, versus more than $6000 in the utility-driven model. The difference in value stemmed from three sources: customer owned systems have lower effective load carrying capacity, which reduces the location-specific peak capacity benefits; customers received REC payments from the utility; and the utility lost revenue due to the customer-owned PV system.

From a utility planner's perspective, customer-driven PV is an uncertain resource with regard to location, size, construction timing, peak resource timing, maintenance, and ELCC. At California PUC hearings in 2005, these issues prompted debate between utilities and solar advocates about the value of PV as a capacity resource. Consumer PV advocates, such as Vote Solar, assumed a 50 percent ELCC.[3] However, one utility asserted an ELCC value of just 14 percent, and other utilities raised similar concerns. Studies in New Jersey and elsewhere point to a 50 to 60 percent ELCC for customer-owned PV systems.[4] Even at that level of ELCC, a utility may convincingly assert that the solar resource would have very limited value.

From most customers' perspectives, utility investments in DPV would be welcomed as a way to help deploy more solar throughout the community. Utilities have patient money, low interest rates, technical skills, and a long-term outlook. They can put a PV system on a customer's roof or over its parking lot, include a host-site rate discount and liability coverage, and integrate it with storage and/or load controls. The customer visibly supports solar energy and has a lower electric bill, but has no investment risk, maintenance responsibility, property tax bill, etc. Moreover, this DPV resource is for the utility as a whole, just like the rest of its system. All customers benefit equitably from the cost savings and risk reductions that the utility solar strategy brings to the table.

3. SOURCES OF DPV ECONOMIC VALUE[5]

A partial list of DPV economic value terms, short definitions (necessarily over-simplified due to limited space), and indicative economic values (if published) are listed in Tables 1 - 3. The "correct" value for most of these terms depends on internal utility data. Each utility has unique values for the costs and benefits of DPV at various locations and times on its system.[6] Not all of these terms may be relevant to each utility, and many are subject to changing market conditions. Table 1 summarizes the terms associated with traditional utility operating and capital budgets.

Table 1: Selected Sources of Value in Utility Budgets from Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Peak Load Value	
Distribution investment deferral[7]	< $0 to > $6000 per marginal kW for 5 year deferral
Transmission congestion relief[8]	$30 - $50/kW-yr
Transmission investment deferral[9]	$45/kW-yr
Generation capacity	$475/kW[10]; $1550 - $2000/kW if IGCC + Carbon sequestration[11]
Generation O&M[12]	~$10/kW-yr
Generation reserve capacity and O&M[13]	$.014/kWh for peak period
Natural gas[14]	$8.50/MMBTU; highly volatile future prices
Purchased power	PV supply curve offsets highest cost power in generation supply curve
Minimum load power plant dispatch[15]	$28/kW-yr
Environmental[16]	$0.014/kWh NO_X; also Mercury, SO_2, CO_2, PM10
Line losses	Up to 25% in some constrained systems
Reactive power[17]	$15/kW-yr
Voltage support	Varies; may be part of distribution investment deferral
Network O&M[18]	~ $16 to >$88/kW-yr
Intermediate Load Value	
Natural gas	$8.50/MMBTU; Peak + intermediate gas cost NPV $1800 - $3500/kW (increasing, with more volatility due to oil and gas depletion)
Environmental	$0.014/kWh NOx; others
Line losses	6% - 8%

Source: ElectricSUN synthesis from published studies of distributed energy resource benefits and costs, and oil and gas market data.

Table 2 identifies the public policy and business model-driven values. As an example, if a utility owns a DPV resource, it can be redeployed to defer successive distribution system investments.

Table 3 illustrates several risk management issues that are affected by the utility DPV strategy. These will be of special interest to institutional investors who are beginning to evaluate utilities' carbon risk, and to regulators concerned with price volatility and grid reliability. One risk of particular note is the uncertainty of long-term natural gas supply. DPV directly reduces natural gas use for power generation, stretching its supply, and reducing the impact of supply disruptions.

Table 2: Policy and Business Model Economic Value from Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Policy-Driven Value	
Net metering payments	Normal utility rate; moving to Time-of-Use rate
Customer rebate payments	Varies by jurisdiction
Solar renewable energy credits	In NE US (PJM) region $200 - $600/MWh; others much less
Business Model Value	
Customer revenue retention	Normal revenue reduces non-participant cost issues
Peak-period DPV revenue	Sell DPV capacity into peak power market
Tax investor participation[19]	30% PV capital cost through '07; 10% after that
PV system portability[20]	~$2000/kW if redeployed 4x to dist. deferral projects
(Payment to PV host site)	Perhaps 10% of rate, plus insurance coverage

Source: ElectricSUN synthesis from published studies of distributed energy resource benefits and costs

Table 3: Risk Management Issues Affected by Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Grid reliability & outage prevention[21]	$Billions & lives lost -- societal
Natural gas availability	Threat of Fuel Use Act; oil and gas depletion; physical disruption from storm damage
Financial	Lower interest rates for PV due to lower risk
Regulatory	Avoid regulatory pre-emption
Carbon	New requirements likely
Insurance	Global warming liability coverage
Share price & fiduciary duty	Investor expectations for risk management leadership
Generation portfolio cost and risk	DPV net fixed cost reduces gen. portfolio cost & risk

Source: ElectricSUN synthesis from published studies of risk in the utility industry

4. DISCUSSION

Our perspective in this paper is to create a strategy to complement the existing and important customer-driven solar market. Customer incentives will continue to be crucial to the solar industry's growth. Implementing utility-driven solar, in addition to the customer-driven market, will *bring much faster growth to the overall solar market.*

Solar energy costs have declined by about 20 percent each time total industry capacity doubles. Recently installed, relatively large PV systems cost in the range of $4,500 to $9,000 or more per kW:[22] Typical prices for such projects have been in the range of $5500 - $6000. The low end of the range is from a recent set of projects totaling 5 MW implemented by the California Construction Authority. It benefited from use of thin-film PV and from economies of scale in purchasing and project management similar to those *the utility model suggests.*

At these typical PV prices the utility-driven DPV business model appears to be cost-effective now, without assuming heroic cost reductions or technology breakthroughs, though we believe these will happen. If our analysis is even approximately correct, there is a strong case that utilities can begin now to deploy DPV resources that save money, reduce risks, improve reliability, and reduce energy price volatility.

Utilities can plan their DPV programs to address the highest net resource value opportunities first. As solar prices decline, they can expand their programs to the lesser value locations, and increase their annual capacity purchases. Each annual increment of utility DPV capacity can be designed to save more than it costs.

We recognize that this strategy is a shift in corporate culture for utilities that some observers may regard as improbable. But these shifts are not entirely novel. Examples of this shift have begun to emerge as utility organizations adapt. One *example is the Lakeland, Fla., municipal utility, which now* develops, owns and profits from PV and solar water heating systems located on their customers' buildings. Before deregulation a number of investor-owned utilities experimented with DPV, and many have solar demonstration or green power marketing programs today. These programs can form the foundation of a solar resource program, and many parts of the utility – from account managers to distribution planning, risk management, fuel and power purchasing and others – will begin adding *significant strategic value to the company by integrating* DPV into the distribution system.

At the same time, regulatory policy support will likely be crucial to encourage utilities to develop their DPV resources. Solar set-asides as greater parts of state or federal RPS programs would likely prompt utilities to evaluate their solar REC purchases on a "make or buy" basis. The question is, will it be more profitable to deploy DPV, or to buy customer RECs? Just asking the question can begin to reveal appropriate DPV applications.

Regulatory benefit sharing can further stimulate utility DPV development. This will need to address the various utility business structures that have been developed in the past decade, but the general principle is that where DPV saves more than it costs, it can provide savings to customers and returns to stockholders. Regulators could encourage such shared savings, so that utilities will have the incentive and motivation to carefully plan, implement and account for their DPV programs.

The scale of the potential utility-driven market is very large. A study for the Energy Foundation (EF) estimates the rooftop PV technical potential in the US will be 1000 GW by 2025. However, they estimated that only 47 GW could be produced through the customer-driven model by 2025, and that is bullish next to the industry's PV Roadmap, also predicated on customer-driven demand. It forecasts less than 20 GW cumulative by 2020. Considering that there is less than one GW of grid-connected PV currently installed in the US, these market potentials are impressive; yet these goals leave a tremendous market untapped, on rooftops as well on sites that were not counted in the EF study.

We have not estimated the market potential of the utility-driven model, though we believe this can and should be done. An initial market study might focus on RPS states and regions that have summer peak demands, where the utility-driven strategy will work best. We expect that the high value of these opportunities could drive a greater, national RPS, perhaps to a 20 percent national standard, with interstate tradable RECs. Such a policy could transform a potentially competitive relationship between the wind and solar industries into a highly collaborative one, which also could encompass demand-response advocates.

Value chain management is a crucial issue. Utilities' procurement strategies will need to be structured to support and enable the rapid growth of the solar industry, so that it can supply the required capacity. This is a challenge that will require regulators, legislators, and stakeholders to understand and support significant value chain management investments in capital, purchase contracts, and long-term commitments.

Further research is required to more fully develop the utility-driven DPV model. Market studies are needed. Utilities' organizational and regulatory constraints need to be resolved. Particularly in cases where deregulation has affected the distribution utility's ability to own generation, regulatory remedies may be required. Scale and timing of solar industry investment needs to be studied, and capital sources and structures to enable unprecedented growth must be designed.

5. CONCLUSION

Utility-driven DPV investments can be economically attractive, even at today's PV prices. No technical or research breakthroughs are required. What is required is new thinking in both organizational capability and business model innovation in both the utility industry and the solar industry. This paper demonstrates that solar energy can be cost-effective now, if implemented in a way that creates economic value for utilities, their customers and shareholders, and the solar industry.

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EXHIBIT DH-2

SDF SOLAR PV GRANT PROGRAM IN SOUTHEASTERN PENNSYLVANIA

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ABSTRACT

The Sustainable Development Fund (SDF) Solar PV Grant Program for Southeastern Pennsylvania has been running for over three years. Due to limited funds, the program targets small sized PV systems installations. As of early March, 2005, over 70 PV systems have been installed without any significant problems. It was one of the first PV programs in the U.S. to include a performance-based incentive, which has been very successful. This paper describes the some of the details that define the program and the protocols used, as well as its current status.

1. INTRODUCTION

The SDF Solar PV Grant Program for Southeastern Pennsylvania officially started in December, 2001. Created by the Pennsylvania Public Utility Commission in its final order in the PECO Energy electric utility restructuring proceeding, SDF has been helping to create a sustainable energy future for Southeastern Pennsylvania. Specifically, the funds for the solar PV grant program are from a settlement with PECO Energy when they were merging with Unicom Corporation in Chicago, IL, in 2000. The SDF received a total of $4 million to help develop the infrastructure for commercializing the installation of solar PV systems primarily within the PECO Energy service territory. The PV system capacities are intended to be very small, limited between 1 kW and 5 kW (10 kW for non-residential applications), though some special projects are allowed to extend beyond these limits.

2. PROGRAM DESCRIPTION

Highlights of the the SDF Solar PV Grant Program are as follows:

- Customers from any sector within PECO Energy's service territory are eligible for receiving grants through this program; however, there are exceptions for special projects outside of the PECO Energy region;
- Solar PV system capacities must range from 1 kW_{DC} to 5 kW_{DC} (nominal DC watts at Standard Test Conditions) for residential installations, and 1 kW_{DC} to 10 kW_{DC} for non-residential installations
- Grants are paid in three payments,
  - Buydown incentive (paid to the PV contractor): $4/watt up to $20,000 for 1 kW_{DC} to 5 kW_{DC} capacities; $3/watt up to $15,000 from 5 kW_{DC} to 10 kW_{DC} capacities
  - Performance incentive (paid to the PV system owner): $1/kWh of gross solar electric generation for the first year up to $7,500
  - Performance incentive (paid to the PV contractor): $0.10/kWh of gross solar electric generation for the first year up to $250
- The PV modules and inverters must comply with hardware standards (e.g., California Energy Commission's approved lists); non-listed components may be eligible provided they meet the appropriate standards
- A detailed solar energy audit must be conducted as the start of the grant application process, such that it demonstrates the proposed PV system installation is well sited
- A conventional utility-grade kWh meter(s) must be installed for recording the solar production in order to receive the performance incentive
- The PV contractor should conduct an acceptance test of the system to ensure it is performing as expected – the PV system is then inspected by the program administrator

- The PV contractor provides a full five-year manufacturer's warranty on the PV modules and the inverter and a two-year labor warranty for any maintenance or repairs

3. OVERVIEW OF PROGRAM PROCEDURE

The first step is for the potential PV system owner to select a solar PV installer from the SDF-approved list of PV contractors. The contractors do a turnkey installation of the PV system, which begins with a detailed solar audit at the customer's site, as required by the SDF PV Program. The contractor then designs the PV system and provides a cost estimate to the customer. The contractor also fills out the grant application which requires the solar audit results, PV equipment specifications, and the installation cost estimate information. Solar PV generation is estimated by using the National Renewable Energy Laboratory's (NREL) web-based PVWATTS software program. The grant application along with a site plan is then submitted to the SDF PV Program administrator for review. After the grant application is approved, the project can begin, and the contractor obtains any required permits and applies for an interconnection agreement with PECO Energy.

After the PV system is installed, and inspected and approved by an electrical inspector, PECO Energy goes to the site and replaces the existing meter with a pair of detented (unidirectional) automated meter reading (AMR) meters. One meter measures incoming electricity, and the other measures outgoing electricity. Then the SDF PV Program administrator inspects the PV system to verify that the installation is consistent with the information included in the original grant application. The program administrator also conducts a detailed solar audit and checks that the installation complies the National Electric Code (NEC), as well as other requirements. In addition, the administrator conducts a performance inspection of the PV system (e.g., acceptance testing). Finally, the solar production kWh meter reading is recorded by the administrator (the initial reading for the annual performance incentive). All other meter readings, such as inverter and PECO Energy AMR meters displays, are also recorded.

As part of the inspection approval process, the contractor is required to submit several documents to the program administrator, as well as to the PV system owner. These are described in "**6. Checklist of Deliverables.**"

Upon the final approval of the PV system, the buydown incentive payment is sent to the contractor, along with a system performance report (if acceptance testing of the PV system was conducted during the inspection).

After a year, an anniversary inspection is conducted, in which the solar production kWh meter reading is recorded again, along with readings from all other meters. The PV system is briefly looked over again, and the system owner, if available, is generally asked about their system's performance and their overall satisfaction with the installation project. If the anniversary inspection takes place exactly one year to the day of the initial system inspection, then the performance incentive is easily calculated; otherwise, local daily solar irradiance data are used to normalize the near-annual solar production estimates.

Finally, the performance incentive payments are sent to both the PV system owner and the PV contractor, along with a short report, which describes the annual performance data and other information about the system's performance.

4. LIST OF PARTICIPATING CONTRACTORS

Currently, there are about 20 approved PV contractors listed with the SDF Solar PV Grant Program. In general, all the listed Participating Contractors of the SDF PV Program had to meet at least the minimum criteria of passing a proficiency test for installing PV systems.

In October, 2001, before the SDF PV Program was launched, Florida Solar Energy Center (FSEC) conducted a five-day training seminar in the Philadelphia area. More than twenty participants attended the training, which was subsidized by the SDF. Most of the trainees passed a proficiency test after the seminar, making them eligible for registering on the SDF List of Participating Contractors. The FSEC training was exceptional and very well-received by the attendees.

Since then, other installers have been approved for being included on the List of Participating Contractors, which requires a certificate of achievement from either FSEC, Solar Energy International (SEI), NY Solar Energy Industries Association, or other SDF recognized training centers. And, of course, NABCEP certified contractors are eligible.

Finally, contractors that have PV installation experience, but do not hold any of the above certificates, as a last resort, must pass a proficiency test provided by the SDF PV Program in order to be eligible for registering on the contractors list. They must also show proof of insurance and sign an agreement about jobsite behavior.

5. SOLAR AUDIT REQUIREMENT

The PV contractor must conduct a detailed solar audit of the site, which includes a shading analysis (preferably using the Solar Pathfinder tool) and solar electric production estimates

from running the National Renewable Energy Laboratory (NREL) PVWATTS simulation model. Both sets of results are to be combined to estimate the overall annual solar electric production by month. As a requirement of the SDF Solar PV Grant Program, the solar audit results must demonstrate that the proposed PV system will produce at least 70% of what it would produce if it had optimal orientation and no shading impacts. These results are submitted by the contractor as part of the grant application.

Since the solar audit analysis can be a time consuming effort, the program administrator developed a Microsoft Excel spreadsheet software program, called the *Solar Audit Assistance Tool* to expedite this process. It has been well received by all the PV contractors and is used for most of the applications.

The Solar Audit Assistance Tool combines results from the Solar Pathfinder device and results from running the PVWATTS simulation program to estimate shading impacts and overall solar electric production for a PV system of given capacity. Electric billing data may also be entered and compared to the PV system production.

One of the key features of the Solar Audit Assistance Tool is having an easy approach to calculating the shading impacts from a Solar Pathfinder sunpath. For illustration, Fig. 1 depicts a Solar Pathfinder sunpath recording as it correlates to a filled out checkbox matrix in the spreadsheet program.

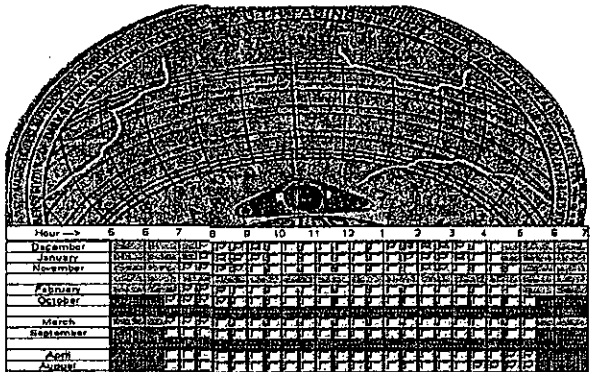

Fig. 1. An Example Correlating Sunpath Data to the Solar Pathfinder Data Processor Matrix

The spreadsheet offers the choice to navigate to the NREL PVWATTS website to calculate the solar production at an unshaded site, or this can be calculated internally. The spreadsheet has a database of pre-calculated results of over 1400 fixed-tilt orientations in 5 degree increments of both azimuth and tilt angles for a 1 kW capacity using Philadelphia weather.

The following figure shows the final results of an example solar audit from the model.

Solar Audit Results And Estimated PV Generation

Project: Smith Residence; 123 Equinox Lane, Philadelphia, PA

Nominal DC Capacity (kW$_{DC}$)	2.00
Annual Derating Factor	0.8
AC Capacity (kW)	1.45
Tilt (degrees)	25
Azimuth (degrees)	225

Month	Estimated AC Generation (Unshaded) (kWh) from PVWATTS: Reference Tilt: 35 deg Azimuth: 180 deg	Estimated AC Generation (Unshaded) (kWh) from PVWATTS: At-Site Tilt: 25 deg Azimuth: 225 deg	Solar PathFinder Results (% Unshaded)	Adjusted Solar Exposure (%)	Estimated AC Generation At-Site W/Shading (kWh)	Estimated Electric Consumption: Gross (from Utility Bill)	Estimated Electric Consumption: Net	Estimated % Electricity Offset by Solar PV
Jan	130	109	71%	56%	77.5	444.3	366.8	17.5%
Feb	168	134	94%	79%	126.3	327.3	201.0	38.6%
Mar	196	167	95%	82%	172.5	420.9	248.0	41.1%
Apr	192	165	97%	95%	168.8	361.2	172.4	53.3%
May	207	210	93%	84%	171.3	381.2	208.9	45.7%
Jun	206	213	76%	79%	161.7	368.5	207.2	43.8%
Jul	213	217	92%	84%	177.5	418.3	241.4	42.4%
Aug	216	218	92%	93%	200.9	422.5	221.6	47.6%
Sep	168	175	100%	89%	175.0	415.8	240.8	42.2%
Oct	181	157	97%	80%	141.3	422.5	278.2	34.3%
Nov	132	108	85%	69%	91.4	372.8	281.4	78.3%
Dec	108	90	66%	55%	58.6	374.8	316.0	15.7%
Monthly Avg.	170	167			145.8	395.1	249.3	36.9%
Annual Total	2141	2008	86%	82%	1750.1	4741.1	2991.0	36.9%

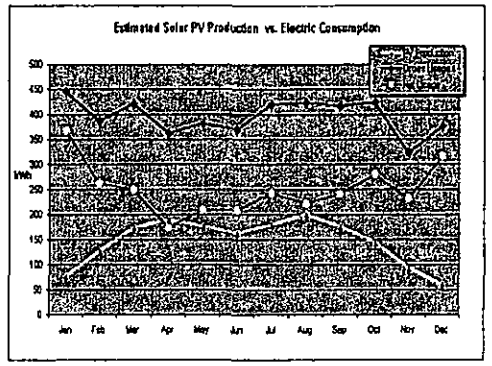

Fig. 2. Final Results from the Solar Audit Assistance Tool Software

6. CHECKLIST OF DELIVERABLES

The following is a checklist of the deliverables required of the contractor in order to receive the SDF buydown incentive payment. It is preferred that some of these items are delivered along with the grant application or by the time the project is actually starting up. However, all of these items must be delivered to the SDF administrator by the time of the PV system inspection or shortly thereafter. The deliverables are as follows:

- Solar Audit Results and Site Plan – these are required before the grant application is approved
- PV System Inspection/Completion Form – this includes general information and an installation

cost breakdown, but also includes acceptance testing results by the contractor

- Wiring Diagram - this can either be one of the prepackaged wiring diagrams provided by SDF or *the contractor's drawing*
- PV Module/Inverter Map - This is a rough drawing that correlates the PV modules to each inverter, if more than one inverter is installed; using a simple numbering system or color scheme could be used
- Copy of the Invoice or Contract - *This should show* the costs invoiced to the system owner by the contractor; if it is the contract itself, it should show the signatures of all parties.
- Copy of the Warranties - Copies of the PV module and inverter manufacturer's warranties, along with a copy of the contractor's two year labor warranty.
- Copy of the Invoice for the Meter Pan Installation for PECO's 2nd Meter – Currently, the PECO Energy net metering tariff allows on-site generators to use a non-ratcheted, bi-directional utility meter; however, PECO Energy recently upgraded all their meters – these cannot spin backwards. So a second meter needs to be installed for net metered customers – at PECO Energy's expense. This document is needed for the customer's reimbursement
- PV System Owner Binder – This should include the following,
  - Summary sheet of contractor contact information and the PV system description, including total system capacity, type and number of modules and inverters, and any other general details
  - Manufacturers user manuals
  - Site plan
  - PV module/inverter map
  - Wiring diagram
  - Solar audit results (so the customer can track their system's performance against the audit estimates)
  - All warranties, both manufacturers' and labor
  - Contract (optional)

Note – The program administrator does not want a copy of this binder, but expects to see it at the site during the system inspection

- Labels - All equipment must be appropriately labeled in order to comply with NEC and PECO interconnection rules.

An example of the *PV Module/Inverter Map* is as follows.

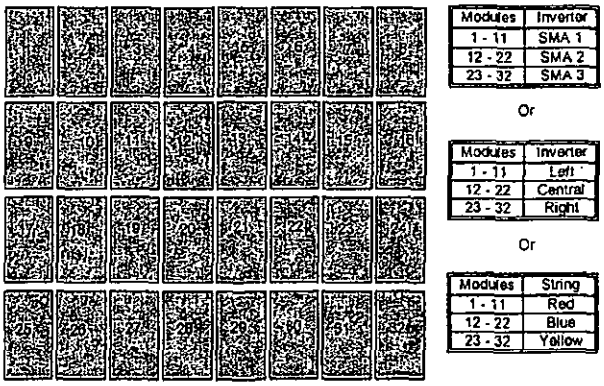

Fig. 3. Example of a PV Module/Inverter Map

The program administrator developed a set of wiring diagram templates for the contractors to fill out for their projects. Because the PV systems sizes are small, it was useful to develop several generic configurations that represent most of the installations in place, particularly those with the high voltage PV systems. This has greatly simplified this requirement for most of the contractors, while ensuring it's delivery in a standard format to the program administrator. All the wiring diagram templates are drawings in an Excel spreadsheet, so they can be modified if needed. Fig. 4 shows one of the many wiring configurations available. Other configurations include one, two or three PV strings or arrays wired to one or two inverters – either 120 VAC or 240 VAC. At the bottom of the drawing shows a table to be filled out which details the module and the string/array specifications. This can be referenced as a guideline when conducting the acceptance testing procedure.

7. SYSTEM INSPECTIONS

After the PV system installation is completed, the contractor should conduct a system checkout, including an acceptance testing of the system. Unfortunately, however, the latter is *not often carried out by the contractor. But, this is slowly* changing, as each contractor experiences more installations. After the PV system passes an electrical inspection, PECO Energy replaces the existing utility meter with a pair of detented (unidirectional) automated meter reading (AMR) meters.

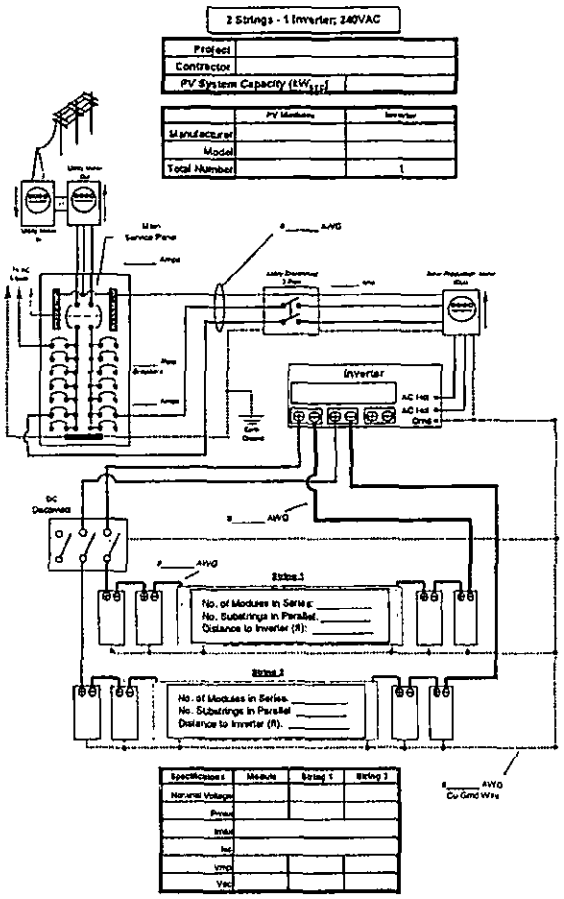

Fig. 4. Wiring Template for a Single 240 VAC Inverter with High DC Input Voltage from Two Strings

At this point, the program administrator conducts a thorough inspection of the system installation. Often, this is done on a very clear day around noon to provide a more accurate system performance inspection. However, performance testing is not always carried out due to long durations of poor weather.

The beginning of the system inspection consists of a visual check of the overall system to verify that the components match those described in the grant application. A detailed solar audit is conducted to verify that the combination of orientation and shading impacts are in compliance with the program requirements. The solar audit results are also used for comparison to the actual annual solar electric production of the PV system.

Local electrical inspectors are still not up to speed with thoroughly inspecting PV systems; so the program administrator may follow-up with greater scrutiny. This includes checking that:

- the racks and PV modules are fastened securely for roof installations
- the free air single conductors are tightly secured on the racking hardware and not lying on the roof surface, and
- all mechanical and electrical grounding details are NEC compliant, as well as for the rest of the system wiring (as it relates to NEC Article 690).

Finally, the administrator conducts a performance inspection of the system, if weather permits. This involves recording the following,

- Solar irradiance from the same plane as the PV *modules with a pyranometer*
- PV module temperature using a radiometer (i.e., collected from the back of the modules, otherwise its recorded as close as possible from the front of the modules)
- DC and AC voltage and current readings (when the PV system is in normal operation)
- Short circuit current and open circuit voltage of the PV strings before they enter the inverter(s) (when the PV system is shutdown)

After analyzing these data, a system performance report is sent to the contractor which includes,

1. Overall AC Performance,
2. DC Performance of the PV Array, and
3. Inverter Efficiency.

The *Overall AC Performance* test simply compares the calculated power of the PV system (based on the measured operating voltage and current readings, relative to measured irradiance) to the expected performance of the system based on the nominal PV capacity (DC @ STC) and using a DC/AC derating factor of 0.7. This ratio is expected to be greater than 0.90.

For the *DC Performance of the PV Array* test, two software packages are utilized: *SunAngle* (Shareware found at http://www.susdesign.com/) and Maui Solar Software (www.mauisolarsoftware.com). Based on the measurements taken at the site, including solar irradiance, ambient and module temperatures, and both string voltage and current (e.g., open circuit, short circuit and under load), the DC array performance can be estimated. The Maui Solar Software contains a program called "IV-Tracer," which was developed by Sandia National Laboratories and

includes an extensive database of PV module I-V curves (e.i., current, voltage and power characteristics for a given PV module). On-site conditions can be entered into the software model and the given I-V curve will adjust accordingly, thus estimating performance at the site, relative to Standard Testing Conditions (STC). Therefore, the tested condition of the DC string/array is compared to the theoretical results from the software programs. Ideally this ratio, the *DC Performance Factor*, should be greater or equal to 0.90.

The *Inverter Efficiency* test is simply calculated based on the DC input and AC output of voltage and current measurements while the PV system is in normal operation. This result is expected to be within a few percentage points of the inverter manufacturer's specifications.

At this time, these tests are for information gathering and analysis. Although most of the PV systems passed the criteria for these three tests, there were a few that fell a little below the expected values; nevertheless, it did not result in any PV systems failing the performance inspection.

8. PROGRAM STATUS

Table 1 shows the status of the SDF Solar PV Grant Program, as of March 8, 2005.

	Submitted (Total)	Application Status: Approved	Application Status: On Hold	Installation Status: Installed	Installation Status: Installing	Installation Status: Pending
# of Systems	116	98	18	61	11	26
Total Capacity (kW)	407.6	350.1	57.5	212.5	25.4	112.1
Avg. Unit Capacity (kW)	3.5	3.6	3.2	3.5	2.3	4.3
Total Est. Production (kWh/yr)	423,766	364,887	58,900	226,488	27,335	111,064
Total Installed Costs	$3,428,011			$1,995,268		
($/watt)	8.41			8.38		

	Incentive Payments: Committed	Incentive Payments: Paid
Buydown	$1,609,378	$866,323
Customer Production	$350,117	$97,645
Subtotal	$1,959,495	$963,968
Contractor Production	$22,409	$6,114
Total	$1,981,904	$970,082
% Installation Cost Offset	57.2%	48.3%

Committed includes all the grant applications submitted

Paid includes vouchers sent into SDF, though not necessarily paid to recipients yet

% Installation Cost Offset excludes the contractors' production payments; the Paid percentage is lower than the Committed percentage because most of the Customer Production has not been paid yet.

Number of Customers That Completed the Anniversary Cycle: 27

Table 1. Status of the SDF Solar PV Grant Program

The above table shows 116 applications have been received (~408 kW_{DC}), of which 72 PV systems (~238 kW_{DC}) have been installed (or are currently being installed at the time of this writing). Several of the applications are still being reviewed and are on hold; most of these involve missing site plans or other minor details outstanding from the application. The average capacity for a PV system is about 3.5 kW_{DC} and the installed cost is about \$8.40/$watt_{DC}$, ranging from less than \$7/$watt_{DC}$ to over \$12/$watt_{DC}$. This includes an average labor cost of about \$1,600 per kW_{DC} installed.

The table also shows that nearly \$2 million, or almost half of the \$4 million budget for the PV program is has committed to grant applicants, which includes about \$1 million already paid for installed PV systems. However, it is projected that about 13% of the total applicants will probably not follow through with an installation, so the total committed funding amount will increase after this is modified.

Fig. 5 graphically show the cumulative grant applications received and installations completed, both as number of systems and as total of system capacity. Applications received by quarter are also shown.

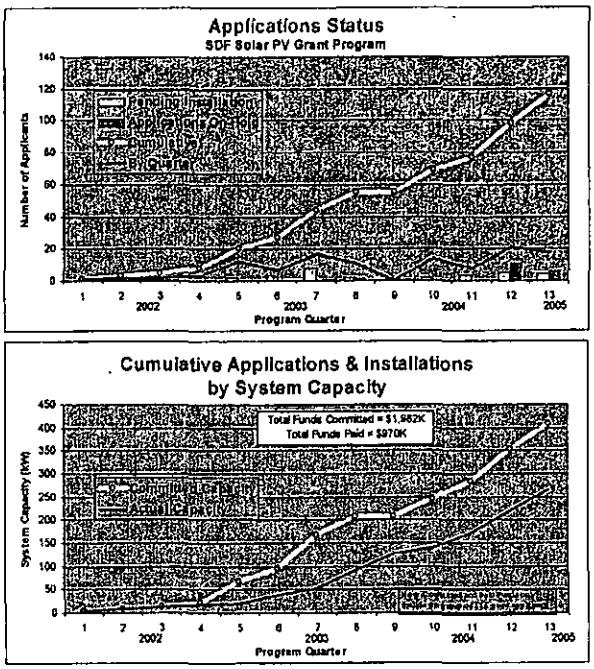

Fig. 5. Quarterly and Cumulative Applications & Installations by Number and Total PV Capacity

Of the 72 PV systems installed or currently being installed, 54 of these are residential and 17 systems are non-residential (note that some of the non-residential applications are home-offices). 64 of these systems are grid-tied, while 8 of them have battery backup or uninterrupted power supply (UPS). As expected, the majority of these are roof mounted systems, totaling 65 installations, whereas the remainder are 6 pole-mounted

systems (4 of which are 2-axis trackers), and a one ground-mounted system.

On average, about 57% of the installed cost of a PV system is offset by the SDF grants, when including the performance incentive. So far, the average solar production from 27 PV systems relative to their DC rated capacity is 1,062 kWh/kW_{DC} per year, ranging from 701 kWh/kW_{DC} to 1,565 kWh/kW_{DC} per year. It has been observed that optimally placed PV arrays – unshaded, face South within a few degrees, and tilted around 30 to 35 degrees (fixed) - are producing about 1,200 kWh/kW_{DC} per year (these are grid-tied PV systems without battery backup). Whereas the 2-axis tracking systems are producing about 1,500 kWh/kW_{DC} per year or more. Due to the range of system performance, the combined SDF incentives equate to an average buydown incentive of $\$5.03/watt_{DC}$, ranging from $\$4.42/watt_{DC}$ to $\$5.46/watt_{DC}$; though, some of the performance incentive payments reached their limits set by total payment cap of $25,000 for a given 5 kW_{DC} residential PV system.

The breakdown of PV manufactures used for these systems include, 26 BP Solar, 22 GE Energy (previously AstroPower), 14 Sharp, 8 RWE Schott, and 2 Uni-Solar. Finally, the breakdown for inverter manufacturers include 62 SMA (Sunny Boys), 8 Xantrex, and 2 Outback.

Over the three years since the program began and up through February, 2005, the estimated total program are about $268,300, excluding the incentive payments. The cost breakdown for this is shown in Table 2.

General Operations	$ 108,800
Marketing/Education	$ 98,200
Grant Processing	$ 45,000
Technical Support	$ 16,300
Total	$ 268,300

Table 2. Estimated Overall Program Costs

The actual costs to run the program would only include General Operations and the Grant Processing costs, while the Marketing/Education and Technical Support are added costs to promote the program and educating the public.

The general operations cover most of the administration costs, including the startup cost, customer support, development/copying and sending of forms and documents, oversight of listed contractors, etc. Grant processing costs include application review, inspections and analysis from solar audits and acceptance testing; this cost is considerably delayed because many of the grant recipients have yet to complete their anniversary cycle (only 27 systems have completed the anniversary cycle). The anniversary inspections tend to increase the grant processing costs. However, they allow the inspector to review how the installations are holding up after a year, and to get feedback from the PV system owners about their expectations.

Technical support covers some assistance that the program administrator has provided to the contractors for some of their projects, but most of it has been for early development and oversight of several special projects which were sought after by SDF as show case projects. Program-listed contractors have done the installations for the special projects. It also included the cost of building a demonstration solar PV trailer for education purposes.

As seen from Table 2, marketing and education costs are relatively low, where most of these expenses have been for education. Since so little has been spent on marketing the SDF Solar PV Program that market penetration has been on the low side. More money is intended to be invested in marketing towards the end of the fourth year of the program.

9. ADDED BONUS FOR PV SYSTEM OWNERS

Independent of the SDF PV Grant Program is The Energy Coop of Pennsylvania's (ECAP) Solar Buyback Program. Most of the Pennsylvania electric supplier industry is deregulated, including PECO Energy, so most electric customers can choose their electric supplier. ECAP is one of the few electric suppliers in the PECO Energy region that offers 100% renewable power.

ECAP is a nonprofit company that prides itself in harvesting renewable energy from local sources, which include wind, hydro, landfill gas and solar PV. So far, they purchase gross solar electric generation from about 25 PV system owners and add it to their mix of renewable power supply. The PV system owners are selling all their solar generation, not just the solar renewable energy credits (SRECs), so the owner must purchase all of their electric supply back from ECAP (to avoid double counting). ECAP purchases the solar supply at $0.20/kWh and sells the renewable energy mix back to the customer at $0.0725/kWh, making the Solar Buyback Program very attractive to the PV system owner. In addition, the customer benefits from net metering on the electric distribution portion of their bill.

10. CONCLUSION

The SDF PV Grant Program has been very successful with meeting many of its objectives, primarily building an infrastructure for installing solar PV systems in the region. There has been significant follow-up with many of the solar PV system owners, and most all of them are very satisfied with their system.

There have been very few problems with the systems installed. One inverter failed after six months, but is was

repaired after a few weeks. All the other problems, most of which were minor, but some were potentially concerning, were rectified early-on during the installation or design phases. This has been partly due to the program administrator's availability and sometimes his involvement with technical support in the early stages of the installation process.

So far, no PV system has failed an inspection, although there have been a few sites that have been on the edge of complying with the 70% solar exposure criterion, but adjustments have been made to reconcile these installations.

Finally, the Philadelphia Million Solar Roof partnership (although not been mentioned earlier), along with ECAP's Solar Buyback Program, have both been very instrumental in making this a successful grant program.

11. REFERENCES

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(5) Sustainable by Design; SunAngle website: http://www.susdesign.com/
(6) The Energy Cooperative of Pennsylvania website http://www.theenergy.coop/
(7) Philadelphia Million Solar Roofs website: http://www.phillysolar.org/

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Duquesne Light Company for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger	:	A-110150F0035
Application of DQE Communications Network Services LLC for a Certificate of Public Convenience Under Section 1102(a)(3) of the Public Utility Code Approving the Acquisition of Duquesne Light Holdings, Inc. by Merger	:	A-311233F002

SURREBUTTAL TESTIMONY

OF

DAVID HUGHES

ON BEHALF OF CITIZEN POWER, INC.

JANUARY 23, 2007

Q. **Please identify yourself for the record.**

A. My name is David Hughes. I am the Executive Director of Citizen Power, Inc. My business address is 2121 Murray Avenue, Pittsburgh, PA 15217.

Q. **Are you the same David Hughes who submitted direct testimony in this proceeding on December 21, 2006?**

A. Yes. My experience and qualifications are described in my direct testimony.

Q. **What is the purpose of your surrebuttal testimony?**

A. *The purpose of my surrebuttal testimony is to respond to certain issues addressed* in the rebuttal testimony of Duquesne Light Company ("Duquesne") witnesses Morgan K. O'Brien, Michele Sandoe, and Frederick J. Eichenmiller, and Office of Small Business Advocate ("OSBA") witness Brian Kalcic.

Q. **Please summarize the key aspects of Mr. O'Brien's rebuttal testimony that you wish to address.**

A. In his rebuttal testimony, Mr. O'Brien disputes my conclusion (and the conclusion of other witnesses) that Duquesne and DQE Communications Network Services, LLC (collectively, "Applicants") have failed to show that the proposed acquisition of the Applicants' parent company, Duquesne Light Holdings, Inc. by the Macquarie Consortium will provide substantial affirmative benefits as required by Pennsylvania law.

Nothing in Mr. O'Brien's testimony undermines my position in this regard. Mr. O'Brien's rebuttal testimony regarding alleged merger benefits largely just reiterates the same points he discussed in his direct testimony, which I concluded did not demonstrate substantial affirmative benefits. Moreover, the

proposed commitments that Applicants have belatedly proposed in Mr. O'Brien's testimony do not provide substantial affirmative benefits. I would note that Christopher J. Leslie also briefly addresses the alleged affirmative benefits of the acquisition, but because his testimony generally does not add anything on this issue beyond what is in Mr. O'Brien's testimony, my surrebuttal testimony focuses on Mr. O'Brien's testimony regarding affirmative benefits.

Q. **Please elaborate on your statement that Mr. O'Brien's rebuttal testimony merely reiterates the same points that you previously found insufficient to satisfy the substantial affirmative benefits standard.**

A. In my direct testimony, I observed that the overall thrust of the Applicants' arguments in support of merger approval was that the merger would be beneficial because it would preserve the status quo. I explained that merely preserving the status quo, by definition, does not provide substantial *affirmative* benefits. While Mr. O'Brien's rebuttal testimony perhaps goes into greater detail regarding some of the points raised in his direct testimony, the general thrust of his testimony remains the same. For instance, he continues to argue that the proposed transaction is beneficial because, under the proposed acquisition by Macquarie, Duquesne would remain a Pittsburgh-based company and retain local management and employees.

None of the arguments raised by Mr. O'Brien undermine my earlier conclusion, and, in fact, I view Mr. O'Brien's testimony as largely corroborating the opinion expressed in my direct testimony. For instance, the exchange on page 8 of Mr. O'Brien's testimony confirms my assertion that Duquesne's position is

premised on the illogical argument that maintaining the status quo equates to providing substantial affirmative benefits. Mr. O'Brien is asked: "Do you agree with the assertion by other parties that maintaining the status quo does not provide substantial affirmative benefits?" (Duquesne St. No. 1R at 8:10-11). Mr. O'Brien responds "No, I do not." (Duquesne St. No. 1R at 8:12). Although Mr. O'Brien's response elaborates on why he believes that failing to preserve the status quo would be undesirable, my point is that this exchange *confirms* my assertion that Duquesne seeks to win approval of the merger based on preserving the status quo.

Q. Mr. O'Brien argues that if Duquesne is not acquired by the Macquarie Consortium as proposed, it is likely that a multi-state utility operating company would seek to acquire Duquesne, and Mr. O'Brien contends that the "adverse consequences" to the Pittsburgh region from such a merger could be "profound." How do you respond?

A. Mr. O'Brien's arguments about a hypothetical alternative merger with a multi-state utility operating company are the linchpin of Duquesne's position that preserving the status quo provides an affirmative benefit. Duquesne speculates about a hypothetical merger with a multi-state utility operating company, claiming that such a merger could have adverse consequences. Because an acquisition by Macquarie would avoid these hypothetical adverse consequences, the argument goes, the currently proposed transaction is beneficial. If another proposed merger were to threaten the kind of adverse consequences described by Mr. O'Brien, however, the appropriate course of action would be for the Commission to deny such merger or to attach conditions that offset the adverse

consequences and provided net affirmative benefits. The fact that the proposed acquisition by Macquarie does not present the Commission with the *detrimental* scenarios identified by Mr. O'Brien, however, is not a basis to conclude that the transaction proposed here will provide *affirmative* benefits. As Citizen Power argued in initially protesting the Application, equating the avoidance of detriment with affirmative benefit would negate the substantial affirmative benefit standard.

Q. Mr. O'Brien renews his arguments that the proposed acquisition will improve Duquesne's access to capital and provide Duquesne's senior management an opportunity to access "best practices." How do you respond?

A. In my direct testimony, I observed that Applicants had not quantified any alleged capital cost savings benefits or identified why a merger was necessary to become acquainted with "best practices," and, accordingly, I argued that such alleged benefits could not be viewed as satisfying the substantial affirmative benefit standard. Nothing in Mr. O'Brien's rebuttal testimony has caused me to rethink my conclusions in this regard.

Q. You indicated that the newly-proposed commitments identified in Mr. O'Brien's testimony do not provide substantial affirmative benefits. Please explain.

A. In response to my testimony and the testimony of other witnesses, Mr. O'Brien identified a number of commitments that Duquesne would be willing to make to obtain Commission approval of the merger. Among the proposed commitments are a distribution rate freeze through December 31, 2008, and an alleged increase

in the number of customers to be served by Duquesne's "Smart Comfort" Low Income Usage Reduction Program ("LIURP").

With respect to the proposed distribution rate freeze, such a commitment could only be considered beneficial if it were shown that, but for this "stay out" commitment, Duquesne would have filed for a distribution rate increase to be effective before January 1, 2009. In this regard, Duquesne's response to Citizen Power interrogatory CP-DLC-40 stated that "Duquesne does not possess any studies or analyses regarding when Duquesne might file another distribution case." Duquesne did indicate, however, that "it has been Duquesne's initial intent to file in 2008 for an increase to incorporate the new infrastructure investment." Even assuming that Duquesne followed through with its "initial intent" to file a distribution rate case some time in 2008, such a filing would be in effect for, at most, three months in 2008 after a full suspension. This indicates that the commitment to a distribution rate freeze until January 1, 2009 would provide customers with little or no affirmative benefit.

I will discuss Duquesne's proposed commitment to "increase" to 3,000 the number of customers served under the Smart Comfort LIURP program in connection with my rebuttal of Ms. Sandoe's testimony. Suffice to say, however, that this commitment is not a benefit because Duquesne has already been serving more than 3,000 customers under the Smart Comfort program for the last two years.

Q. *Please identify the key points of Ms. Sandoe's rebuttal that you wish to address.*

A. In response to my proposal that Duquesne commit to serving 4,000 customers per year under its existing Smart Comfort/LIURP program, Ms. Sandoe did not offer any substantive objection. She simply "countered" with a proposal to "increas[e] the number of customers who receive Smart Comfort benefits to 3,000 visits per year." (Applicants St. 7R at 9:31-10:1). As I will discuss, however, serving 3,000 customers under the Smart Comfort program would not represent an affirmative benefit to customers because Duquesne already is able to serve well in excess of this number of customers at existing funding levels. In addition, Ms. Sandoe recommends rejection of my proposal to create a new LIURP, the "Home Energy Savings Program" (HESP) for customers not eligible for Duquesne's existing LIURP. She claims (at page 10:13) that implementing HESP "would dilute the vision of helping those most in need."

Q. *Please explain why you believe that Duquesne's proposal to commit to serving 3,000 customers per year under the existing Smart Comfort program will not provide affirmative benefits.*

A. First of all, it is important to clarify the record regarding the current posture of Duquesne's Smart Comfort program. In my view, Ms. Sandoe's testimony (at p. 9:30-10:1) that "Duquesne will commit to increasing the number of customers who receive Smart Comfort benefits to 3,000 visits per year" could leave the impression that Duquesne currently provides Smart Benefits to less than 3,000 customers per year. That is simply not the case. Attached as my Exhibit DH-3 is Duquesne's response to Citizen Power interrogatory CP-DLC-17, which was sponsored by Ms. Sandoe. As this exhibit shows, Duquesne provided Smart Comfort benefits to 3,003 customers in 2005 and 3,378 customers in 2006.

Further, Duquesne projects that it will provide Smart Comfort benefits to 4,000 customers in 2007. It is also noteworthy that Duquesne has achieved these levels of Smart Comfort recipients while spending less than the total amount budgeted for Smart Comfort each year, a trend that Duquesne expects to continue in 2007. Ms. Sandoe's characterization of serving 3,000 customers as an "increase" apparently refers to the fact that a figure of 3,000 customers exceeds the level of Smart Comfort recipients specified in the recent rate case settlement. As the figures in Exhibit DH-3 show, however, *actual* Smart Comfort recipients are already well in excess of 3,000.

The key factors in determining how many participants should receive Smart Comfort services each year are (a) the amount of money available and the (b) the average cost per job. Based on Ms. Sandoe's interrogatory response attached as Exhibit DH-3, Duquesne has $1,621,565 available to spend on Smart Comfort in 2007 (i.e., the $1,531,250 budgeted amount plus the carryover of $90,315 from 2006). Based on Ms. Sandoe's responses to Citizen Power interrogatories (CP-DLC-21), the estimated cost per job in 2007 will be based on the $323 average cost per job in 2006. This will permit 5,020 customers to participate in Smart Comfort in 2007. Thus my recommendation that Duquesne commit to providing service to 4,000 customers per year was, if anything, too low. Based on Duquesne's own estimates, there would be close to 23,000 eligible customers who have yet to benefit from the LIURP at the beginning of 2008. (See CP St. 1 at 9). Recognizing the economic impact of the LIURP, there is no

justification for not ramping up the Smart Comfort program to provide LIURP services to these customers as soon as possible.

Q. Please address Ms. Sandoe's claim that creating the HESP would "dilute the vision of helping those most in need."

A. Frankly, I don't understand Ms. Sandoe's point. Citizen Power's proposals would only enhance the effort to help those most in need. First of all, as noted, there would be close to 23,000 eligible customers who have yet to benefit from the LIURP at the beginning of 2008. If Duquesne spent every available penny through 2010, it would still not provide LIURP services to all of these eligible customers. In addition, there is a widely-shared view among advocates for low-income customers, myself included, that the Federal Poverty Guidelines are unrealistic and in need of revision. In fact, that is why many low-income service providers have been increasing the eligibility level, with recommendations that services be provided to those at or below 300% and even 400% of the poverty level. The HESP proposes to offer services to "working poor" customers at 151% to 250% of the poverty level; it does not preclude eligible customers from participating in the existing Smart Comfort program. Citizen Power's experience operating a HESP for West Penn Power clearly demonstrated that the working poor, who are, for the most part, not "payment troubled," are also in need of assistance to lower their usage. Contrary to Ms. Sandoe's curious suggestion, however, expanding LIURP services to these working poor customers simply would not cause any "dilution" or diminution in benefits to the customers that currently qualify for Smart Comfort.

Q. Do you have anything additional to add?

A. Yes. Since there has continued to be an overall need for LIURP services that is never met. I recommend that all monies available within a given year be spent within that year. This is a proposal that Citizen Power made in the West Penn POLR II proceeding (PUC Docket Nos. R-00039022; R-00973981) and which West Penn accepted. With such a great need, it makes no sense to keep carrying over funds from year to year and to consistently spend less than what is budgeted for a particular year. Duquesne should do what is necessary to ramp up Smart Comfort to meet the need.

Q. Please summarize the key points in Mr. Eichenmiller's rebuttal testimony that you wish to address.

A. Mr. Eichenmiller claims that the instant proceeding "is not the proper forum" to address Citizen Power's photovoltaic (PV) power proposals. (Applicants St. 4R at 20:15). In addition, Mr. Eichenmiller refers to the settlement in the recently concluded base rate proceeding to claim that Citizen Power's PV proposals are "unnecessary" since Duquesne's "commitment to PEDA will serve to largely address the...development of solar technology in our service territory." (Applicants St. 4R at 22:3-5). Mr. Eichenmiller also suggests that my recommendation for a "customer-driven" PV program like the one in the PECO service territory is "ill-defined." (Applicants St. 4R at 24:15). I take issue with all of these contentions.

Q. You indicated that you do not agree with Mr. Eichenmiller's opinion that this is not the appropriate forum to address solar power issues. Please elaborate.

A. Mr. Eichenmiller's argument in this regard has two parts. First, he suggests that the kind of solar-power initiatives recommended in my direct testimony are better left to "Pennsylvania's competitive markets, [the Pennsylvania Energy Development Authority] and renewable energy providers." (Applicants St. 4R at 23:15-16). He contends that Duquesne already supports such initiatives through the funding of PEDA adopted in the recent rate case settlement. Second, Mr. Eichenmiller argues, somewhat inconsistently, that solar energy initiatives are more appropriately discussed in Duquesne's POLR IV proceeding, which is expected to be filed "in the first quarter of 2007." (Applicants St. 4R at 22:15-18). He argues that in the POLR IV proceeding, Duquesne will "address how we intend to meet our Act 213 obligations." (Applicants St. 4R at 23:14).

The fact that Duquesne would apparently prefer to let PEDA and others address solar power issues is not a valid reason for rejecting my proposals to the extent they would provide affirmative benefits as required under the Pennsylvania merger standard. Moreover, both my proposed "utility-driven" and "customer-driven" solar program recommendations were structured so as to allow experts in solar energy to be part of the process. For instance, my recommendation for a process to evaluate a utility-driven solar program suggested that Duquesne should engage an outside expert to assist in the evaluation. Likewise, I suggested that Duquesne select a qualified administrator to manage the "customer-driven" PV

program that I recommended in my direct testimony. Mr. Eichenmiller ignores these aspects of my recommendations.

With respect to Mr. Eichenmiller's suggestion that solar power issues should be deferred to the POLR IV proceeding, it is important to keep in mind what is at issue in this case. Duquesne is required to show that the proposed acquisition by Macquarie will provide substantial affirmative benefits. It is my conclusion that, as currently proposed, the acquisition would not do so. My recommended solar initiatives are a way of ensuring affirmative benefits to Pennsylvania. Deferring solar power issues to the POLR IV case when Duquesne will purportedly identify its plan to comply with Act 213 would not ensure any affirmative benefits because Duquesne is already required to propose a plan to comply with Act 213. By contrast, conditioning the proposed acquisition upon implementation of my solar initiatives would assure the construction of "customer-driven" PV facilities and would provide for at least the serious evaluation of installing utility-driven PV facilities. These facilities, if installed, would provide the attendant benefits associated with the use of solar energy. I will discuss these benefits later in responding to Mr. Kalcic.

Q. Please elaborate on your concerns with Mr. Eichenmiller's reliance on the PEDA funding included in the Duquesne rate case settlement in Docket No. R-00061346.

A. As a general matter, I am troubled by Mr. Eichenmiller's extensive reliance on the rate case settlement as an alleged basis to reject my solar energy proposals. At the risk of sounding like a broken record, Duquesne must show affirmative benefits

as a result of the proposed acquisition by Macquarie. It is not appropriate for Duquesne to "count" the commitments it made in the rate case settlement toward the substantial affirmative benefit standard. Duquesne received, among other things, a significant rate increase under the settlement, and it is no more proper to count the PEDA funding in the rate case settlement as a merger benefit than it would be to count the rate increase under the settlement as a detriment of the merger. My position is that if Applicants are going to cite a shared commitment to the environment as a basis for approving the merger, Duquesne and its prospective new owners should back up their professed commitments to the environment with tangible support for *new or expanded* renewable energy programs that will provide substantial affirmative benefits. Citing to commitments that Duquesne has already made, and for which Duquesne received substantial consideration, is not a basis for finding substantial affirmative benefit in this case.

Moreover, while Citizen Power applauds the PEDA contributions specified in the rate case settlement, it is premature to conclude that the money Duquesne gives to PEDA will be used for PV. Certainly, it is Citizen Power's hope that this will be the case. But there are any number of ways that PEDA may decide to use that money to support Act 213 Tier I requirements. However, even if PEDA does use the Duquesne money to invest in PV projects, at this point, given the PEDA funding process, no one knows whether those projects will be comparable to what Citizen Power is recommending herein.

Finally, given the multitude of problems related to energy use (which is what led to the enactment of PA Act 213) we have a long way to go in terms of renewable energy investment. A $6 million contribution, even were it to be used solely for PV development, is just a start.

Q. What is your response to Mr. Eichenmiller's assertion that the benefits of your proposed customer-driven solar energy program are "ill-defined?"

A. I am uncertain as to the level of detail that Mr. Eichenmiller wants. In my direct testimony, I suggested that the customer-driven program be modeled on a program implemented in the PECO territory, which was financed by a $4 million grant, funded by shareholders, agreed to as part of the settlement resolving the PECO/Unicom merger proceeding before the Commission in 2000. I recommended that Duquesne likewise be required to make a $4 million investment in such a program, at shareholder expense, and that Duquesne select a qualified administrator to manage this solar energy initiative. Further, I attached to my testimony as Exhibit DH-2 a detailed report on the PECO program, which had been prepared by the program administrator. Notably, Mr. Eichenmiller does not even mention my Exhibit DH-2 in alleging that my proposed customer-driven program lacks adequate detail.

Q. Please summarize the key points of Mr. Kalcic's rebuttal that you intend to address.

A. Mr. Kalcic claims that unless a utility-driven solar energy program allows Duquesne ratepayers "to satisfy their Act 213 solar requirements at a *below-market* cost, ratepayers would be no better off with Citizens [sic] Power's

proposed utility-driven solar energy program than without." (OSBA St. 2 at 5:16-19). Further, Mr. Kalcic uses the 170 installations referenced in my Exhibit DH-1 to minimize the benefits of a Duquesne service territory solar energy initiative. (OSBA St. 2 at 5:31 to 6:4).

Q. Please respond to Mr. Kalcic's argument that a utility-driven solar program would only provide benefit if the solar-generated energy was sold at below market cost.

A. The thrust of Mr. Kalcic's testimony appears to be that, since Act 213 already requires Duquesne to use a certain amount of solar power in serving load, simply requiring Duquesne to invest in solar power resources will not provide any incremental benefit unless Duquesne sells the output of the new solar resources for less than it would have resold solar-generated energy obtained elsewhere in the market. At the outset, I would note that my direct testimony recommended a *process* for evaluating whether a utility-driven solar program would be cost effective for Duquesne and its customers. Mr. Kalcic apparently wants simply to skip this process and proceed directly to a conclusion that a utility-driven PV program is unlikely to provide affirmative benefits.

Conceptually, if a utility-driven PV program can be established that could generate solar energy for less than the prevailing market price, it could provide a benefit by tending to bring down the price for solar energy. My suggestion that a deliberate process be used to evaluate the cost-effectiveness of a utility-driven solar program was intended to ensure that the energy from such a program could, in fact, be competitive.

Finally, adding more solar resources to the grid will provide benefits, including economic benefits, beyond strictly the rate savings that Mr. Kalcic apparently would require. I discuss these benefits below.

Q. Please respond to Mr. Kalcic's argument that your customer-driven PV program should not be adopted because it would only benefit a relatively small number of customers.

A. Mr. Kalcic overlooks the added value of *initiating* a solar energy program for Duquesne, its customers and the region. Using a simple math equation doesn't tell the whole story. By Mr. Kalcic's reasoning, we would never utilize new or under-used technology because, as is usually the case, the initial use of such technology is expensive (which is why it requires government subsidization) and enters the market in small steps until it is competitively priced. The appeal of PV is that, even in the early stages of project development, it provides both environmental and economic benefits to the public at large. Of course, the added value increases as the PV capacity increases.

Mr. Kalcic's rather myopic criticisms of my solar initiatives overlook the broader benefits from solar energy. While the environmental benefits of solar power require little elaboration, the economic benefits of solar energy are also significant. For instance, solar energy facilities can provide demand reduction that corresponds with system peak demand. Given how Locational Marginal Pricing (LMP) works in the PJM Interconnection, installed solar PV would directly reduce the LMP, which could produce significant cost savings during very high system peaks. One would assume that such savings could inure to the

benefit of the OSBA's constituency by allowing consumers to spend money on things other than electricity.

There are many more potential "economic" benefits associated with initiating a solar PV program, including:

- Economic development and job creation
- Lessening the consumption of natural gas
- Avoiding environmental damage
- Improving grid efficiency
- Avoiding transmission and grid upgrades
- Increased reliability and security
- Solar electricity provides local voltage support that can reduce the need for other utility equipment
- Large-scale, dispersed solar deployment can reduce the need for operating and spinning reserves needed to assure electric reliability
- Large-scale solar deployment can reduce the cost of natural gas for other uses like heating, industrial processes and transportation through a price elasticity effect
- The ease of deploying solar projects and their short lead times reduces the risk of forecasting mistakes that can result in costly power generation overcapacity
- The broad public support for solar power and short development time for projects reduces financial risk by beginning capital returns more quickly and minimizing the likelihood of project failure
- The low operational and maintenance costs for solar energy and the opportunity to leverage customer investment reduce the risk of technological obsolescence that could add to an electric utility's stranded costs

Mr. Kalcic's criticisms of my solar initiatives do not take these benefits into account, and his rebuttal testimony does not provide a basis to reject my recommendations.

Q. Does this conclude your surrebuttal testimony?

A. Yes.

EXHIBIT DH-3

Duquesne Light Company and
DQE Communications Network Services LLC
Docket No. A-110150F0035 and A-311233F0002

CP-DLC-17
Sponsor: M. Sandoe
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RESPONSES TO CITIZEN POWER, INC. INTERROGATORIES – SET IV

CP-DLC-17: In an informal discovery request, Citizen Power asked Duquesne to provide the following information: (1) for each of the years 2003 through 2006, the total amount budgeted for LIURP, the amount carried over each year, the actual dollar amount spent each year, and the number of participants; and (2) the amount budgeted for LIURP for 2007, the amount expected to be carried over from 2006, and the projected number of participants. In response, Duquesne, on January 3, 2007, provided the chart attached hereto as Attachment 1. Please confirm that the figures shown in Attachment1 are accurate. If Duquesne cannot so confirm, provide a detailed explanation why not and provide accurate information. If any of the numbers in the chart require modification/updating, please identify such revisions and provide the entire chart as revised.

RESPONSE:

See the chart below:

Year:	Smart Comfort Budget:	Smart Comfort Actual Expenditure:	Smart Comfort Carryover:	Smart Comfort Recipients:
2003	$2,700,000	$1,852,000	$848,000	1,769
2004	$2,131,250	$1,021,250	$1,110,000	2,120
2005	$1,181,250	$1,092,425	$88,825	3,003
2006	$1,181,250	$1,090,935	$90,315	3,378
2007	$1,531,250	$1,292,000 (estimate)	$239,250 (estimate)	4,000 (estimate)

* $1,750,000 + $950,000 from POLR II Filing for 2003.
* $1,181,250 + $950,000 from POLR II Filing for 2004.
* $1,500,000 transferred from Smart Comfort to CAP in 2005.

The Smart Comfort budget for 2006 has been corrected to reflect that the collection of the additional $350,000 does not commence until January 6, 2007. Therefore the increase to the 2006 budget should not have been reflected until 2007. The Company did not commit in the rate case settlement to spend these funds in 2006. Further, 2006 Smart Comfort expenditure, carryover, and recipients have been updated from estimated to actual. Finally, the 2007 estimated expenditure and carryover has been modified. Projected 2007 expenditure is estimated at $1,292,000 which is the 2006 average cost per visit multiplied by the 2007 projected recipients. The estimated number

of 2007 Smart Comfort recipients represents the Company's target stemming from its ongoing efforts to provide eligible CAP customers with a Smart Comfort visit. Specifically, we continue to mandate that new CAP applicants, whose usage meets the minimum requirements of Smart Comfort eligibility, to complete a Smart Comfort visit before enrolling in CAP. In addition, in 2007 the Company intends to continue its practice, which began in 2006, of reviewing existing CAP customers who did not qualify for Smart Comfort at the time of their CAP enrollment but whose usage has risen. The Company will contact these customers to arrange a Smart Comfort visit. However, the 2007 target number will not be sustainable over the long term.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing has been served upon the following persons, in the manner indicated, in accordance with the requirements of § 1.54 (relating to service by a participant).

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