

**SECOND DRAFT**

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**MID-ATLANTIC POWER PATHWAY & DELMARVA**  
EXPERT WITNESS TESTIMONY PRESENTED BEFORE THE MARYLAND  
PUBLIC SERVICE COMMISSION

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On Behalf Of

**DORCHESTER CITIZENS FOR SAFE ENERGY**

December 20, 2009

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## **EXECUTIVE SUMMARY**

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On December 4, 2009, nine expert witnesses presented direct written testimony to the Maryland Public Service Commission (PSC) in PSC Case No. 9179, in which the Applicants have requested that the PSC issue a Certificate of Public Convenience and Necessity (“CPCN”) to construct regarding the proposed Mid-Atlantic Power Pathway (MAPP) project. Eight of these experts testified regarding Delmarva peninsula electric reliability and cost issues as well as impacts of alternatives for addressing both issues. This document presents a summary of this testimony with regard to:

1. Issues that may jeopardize the reliability of Delmarva electric service;
2. Alternatives for resolving Delmarva cost and reliability issues;
3. Effects of MAPP & alternatives on Delmarva electricity costs; and
4. The impact of alternatives to Delmarva environmental and cultural resources.

MAPP would be an extra-high voltage (500 kilovolt or kV) transmission line originating in Virginia, crossing the Potomac River into Charles County, then crossing Prince George’s County and Calvert County, the Chesapeake Bay, Dorchester County and Wicomico County before terminating at the Indian River power plant in southern Delaware.

The applicant, Pepco Holdings, Inc. (PHI) claims that MAPP is needed to maintain reliable and affordable electric service on the Delmarva peninsula and the region. The testimony from the eight expert witnesses provides the first in-depth assessment of the need for the MAPP project and whether more affordable, more reliable, and less environmentally harmful alternatives may be available.

Seven of the eight expert witnesses testified on behalf of three State agencies: the Maryland Department of Natural Resources (DNR), the Maryland Office of the People’s Counsel (OPC), and the Maryland Public Service Commission (PSC). The eighth witness, Dr. Hyde Merrill, testified on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc. All eight witnesses are highly-respected experts, a number of which usually present most of their testimony on behalf of utilities, the consulting groups which service the utilities, utility think-tanks, and the agencies which regulate the utilities.

### **Issues That May Jeopardize the Reliability of Delmarva Electric Service**

Delmarva electric service meets national reliability criteria until the year 2020 when one of the smaller transmission lines (Townsend-Church 138 kV) may suffer an outage. While MAPP would prevent this outage, the experts who examined this issue identified alternatives to address this and other reliability issues at a fourth to a tenth of the cost of MAPP. These alternatives would also cause far less impact to the Chesapeake Bay as well as other sensitive environmental- and cultural-resources. The experts also pointed out that it is difficult to accurately predict reliability issues more than three- to five-years into the future. Furthermore, extrapolation was used to predict more than half of the reliability issues it is claimed MAPP would resolve. One of the experts explained how extrapolation can be very inaccurate. This expert recommended that

far more exacting contingency analyses should be employed. Also, several of the experts cited a failure on the applicants part to factor in declines in energy use which have been occurring since the start of the recession along with anticipated reductions in peak-demand and increased generation.

It is claimed that congestion along existing transmission lines prevents the cheapest electricity from reaching the Delmarva peninsula. This cheaper electricity mostly comes from coal-fired power plants located in the Ohio River Valley. The analyses supporting this claim suffer from the same shortcomings cited above. While MAPP may relieve this congestion the experts also identified alternatives that would achieve this same goal at far less cost to Delmarva customers and with far less impact to the natural and cultural resources which make the peninsula such a great place to live.

Perhaps the most important points to take away from this testimony is that:

- Delmarva does not face an imminent threat of blackouts or other service reliability issues and existing transmission lines have ample capacity to meet electricity needs on the peninsula until at least 2020;
- It is very difficult to predict what issues will affect reliability more than three- to five-years out, much less more than a decade away;
- It is premature to commit to a solution as expensive and intrusive as MAPP given the many uncertainties associated with these long range predictions; and
- There are alternatives for correcting these issues which can be implemented far more quickly at a substantially lower cost to Delmarva customers and the environment when compared to MAPP.

#### **Alternatives for Resolving Delmarva Cost and Reliability Issues**

Four of the five experts provided testimony contrasting the effectiveness of MAPP and other alternatives with regard to Delmarva reliability and electricity cost: Mr. Dwight Etheridge, Mr. Peter Lanzalotta, Dr. Hyde Merrill, and Ms. Sandra Patty. The gist of this testimony is that:

- Alternatives to MAPP exist, such as: standard fixes, Demand-Side Management, increased energy efficiency, increased generation, and upgrading existing transmission lines;
- As shown earlier in Table 1 these alternatives cost a fourth to a tenth of the \$1.05 billion MAPP project yet provide the same benefits;
- The alternatives would be just as effective in resolving reliability issues, perhaps more so in terms of preventing blackouts;

- The alternatives would also relieve the congestion driving up Delmarva electricity prices at a cost substantially below that of MAPP; however
- The applicants have not conducted a reasonable evaluation of the alternatives nor compared the costs and benefits of each with the MAPP project.

### **Effects of MAPP & Alternatives on Delmarva Electricity Costs**

Four of the expert witnesses testified regarding the effect of MAPP and possible alternatives on the cost Delmarva customers would pay for electricity: Mr. Dwight Etheridge, Dr. Hyde Merrill, Mr. Peter Lanzalotta, and Ms. Sandra Patty. MAPP and other alternatives may reduce cost by relieving congestion which prevents the cheapest electricity - that from coal-fired power plants - from reaching Delmarva customers. However, in the case of MAPP a net savings is predicated upon the most favorable of four possible scenarios. If this most favorable scenario fails to unfold then MAPP may have no effect or even drive up monthly Delmarva electricity bills. Also, pending court action may reverse the current practice of spreading the cost of MAPP across 13 states to just a few. Of course this would result in the costs of MAPP to further overwhelm the savings. In contrast, the experts identified alternatives which also relieve congestion, but a one fourth- to one-tenth the cost of MAPP. These far cheaper alternatives are much more likely to provide Delmarva residents with a net reduction in their monthly electricity bills.

### **The Impact of Mapp & Alternatives to Delmarva Environmental and Cultural Resources**

Three of the experts testified about the impact of MAPP to sensitive environmental and cultural resources.

**Chesapeake Bay Impacts:** Dr. William Richkus testified that MAPP could affect an area of Chesapeake Bay bottom measuring 600 feet in width. The applicant's have stated that the length of affected Bay bottom could be 10- or 12-miles. In other words, nearly 900 acres (1.4 square miles) of Bay bottom could be affected. Dr. Richkus stated that some short term environmental impacts from installing the transmission cables could be reduced through timing of construction so that it takes place when sensitive species are least likely to be present. Establishing locations of particularly important habitats, such as oyster beds and submerged aquatic vegetation prior to installation could allow for routing to minimize impacts. *However, based on the biological resources at risk and likely affects of the cable, there is potential for permanent impacts to the aquatic environment that may be substantial, in which case a consideration of alternate routes that would avoid the Bay crossing would be appropriate. However, at this time Pepco has not identified such alternative routes in a way that would provide any basis for making a comparative analysis of impacts.*

**Dorchester County Environmental Impacts:** Mr. Stephen P. Harriott testified that, although the Applicants have not yet specified the MAPP Project's route through Dorchester County, construction of that magnitude, even if done using environmentally sensitive practices, would likely impose impacts to Dorchester County's natural resources, such as tidal and nontidal wetlands, forests, and rivers and streams, given the extensive scope of such resources in the

county. Similarly, the types of wetlands found throughout Dorchester County often provide known habitat for threatened and endangered flora and fauna, thus there could also be adverse impacts to these resources. Given the length of the proposed project, and the abundance of important habitats, Mr. Harriott believes that it is likely that some populations of listed threatened and endangered flora and fauna would be placed at risk by constructing the Dorchester County portion of the MAPP Project regardless of the route.

**Dorchester Cultural Impacts:** Dr. Peter D. Hall testified that significant cultural and heritage resources in Dorchester County could be affected as a result of the MAPP Project. Dr. Hall identified in his testimony several resources potentially at risk, including the proposed Harriet Tubman National Historic Park, a potential National Historic Landmark; the Heart of Chesapeake Country, a Maryland Heritage Area; and numerous other cultural and recreational resources. Moreover, Dr. Hall testified that impact to heritage resources from the MAPP Project could affect the Dorchester and Eastern Shore economies.

## **INTRODUCTION**

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The Mid-Atlantic Power Pathway (MAPP) would be an extra-high voltage (500 kilovolt or kV) transmission line originating at Possum Point, VA, passing through Southern Maryland to the Calvert Cliffs nuclear power plant, then crossing the Chesapeake Bay to traverse the lower Eastern Shore and ending at the Indian River power plant in southern Delaware. Community & Environmental Defense Services (CEDS) is assisting Dorchester Citizens for Safe Energy (DCSE) with concerns regarding MAPP.

For the most part, DCSE members had the same initial reaction to the MAPP transmission line proposal - a strong desire to stop the project. But (as is usually the case) this initial reaction was followed by questions such as:

1. Is the project truly needed?
2. If there is a genuine need, then is it the best option to meet that need?
3. If it is the best option, then must it come so close to my home?
4. If must come so close then how can the transmission line be designed to minimize negative effects on me, my family, my farm, and other quality of life concerns?

This initial stop the project response followed by lots of questions is a typical reaction to proposals which have the potential to pose a substantial threat to quality of life. However, if the questions are answered fully and honestly then most people will eventually find a way to live with a project proven to be truly needed and well-designed. But in the case of MAPP citizens as well as their elected officials have had a great deal of difficulty getting the applicants to provide full, honest answers to their questions.

In December, 2009, citizens had their first opportunity to see the results of a truly independent review of the merits of MAPP. This opportunity took the form of testimony from eight expert witnesses. The testimony was submitted to the Maryland Public Service Commission (PSC) regarding the MAPP transmission line.

Seven of the eight expert witnesses testified on behalf of three State agencies: the Maryland Department of Natural Resources (DNR), the Maryland Office of the People's Counsel (OPC), and the Maryland Public Service Commission (PSC). The eighth witness, Dr. Hyde Merrill, testified on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc. All eight witnesses are highly-respected experts, a number of which usually present most of their testimony on behalf of utilities, the consulting groups which service the utilities, utility think-tanks, and the agencies which regulate the utilities.

In February, 2009, the PSC received an initial application and supporting documents, totaling 1,146 pages, from the applicant: Pepco Holdings, Inc. (PHI). The review conducted by the eight experts was largely based upon the documents submitted by the applicant to the PSC along with

the applicant's responses to nearly 700 questions from State and local officials posed in the form of data requests.

The background of the eight experts, which is provided later in this document, shows that each is a highly-qualified and highly-respected professional whose clients include electric utilities, consulting companies servicing utilities, the government agencies which regulate these industries, universities, energy think-tanks, and occasionally citizen groups like DCSE. In other words, these were not hired-guns charged with trashing MAPP but professionals with impeccable credentials who would not flinch from supporting the need for MAPP if that was what the evidence showed.

This document attempts to summarize the 500 pages of testimony and supporting material these experts presented to the PSC. The goal of the summary is to provide citizens concerned about MAPP with the first independent assessment of two of the four questions presented above:

1. Is the MAPP project truly needed?
2. If there is a genuine need, then is MAPP the best option to meet that need?

If the answer to the first two questions were yes, then further review would address the remaining two questions:

3. If it is the best option, then must it come so close to my home?
- \ 4. If must come so close then how can the transmission line be designed to minimize negative effects on me, my family, my farm, and other quality of life concerns?

### **ABOUT THIS SUMMARY**

This document presents a summary of the key facts and conclusions contained in the testimony provided by the eight expert witnesses who addressed Delmarva issues. The original testimony was structured to conform to the rules of evidence under which the PSC operates. While this structure makes sense in a legal setting it can be difficult to comprehend by the layman.

This summary is an attempt to distill 500 pages of testimony and supporting documents in a way which makes it easier to understand the key facts and conclusions reached by the experts. Each fact-conclusion is followed by the last name of the expert then a page number in parentheses. Clicking on the name will take you to the direct testimony provided by the witness where you can then scroll to the page containing the fact or conclusion. In the event you are viewing a paper copy of this document, following are the addresses where this testimony is posted:

Dwight D. Etheridge: <http://ceds.org/DCSE/Need-StatePPRPExpert.pdf>

Dr. Peter D. Hall: <http://ceds.org/DCSE/Cultural-HistoricImpacts.pdf>

Steven P. Harriott: <http://ceds.org/DCSE/DorchesterEcologicalImpacts.pdf>

Peter J. Lanzalotta: <http://ceds.org/DCSE/Need-StateOPCExpert.pdf>

Dr. Hyde Merrill: <http://ceds.org/DCSE/Need-DCSE-DC-ESLC-NRGExpert.pdf>

Sandra S. Patty: <http://ceds.org/DCSE/PPRPTestimony.pdf>

Dr. William Richkus: <http://ceds.org/DCSE/BayImpact-StateExpert.pdf>

Craig Taborsky: <http://ceds.org/DCSE/Need-StatePSCExpert.pdf>

Text below contained in quotes is taken verbatim from the testimony. Where quotes are lacking the text reflects an interpretation of the testimony by the author who, while knowledgeable regarding the topics addressed in this summary, is by no means an expert. References to relevant testimony generally follows each interpretation. The reader is encouraged to verify the accuracy of these interpretations by consulting the original testimony. But first let's introduce the experts.

## **THE EXPERTS & THEIR QUALIFICATIONS**

Following is a summary of the background of the eight experts.

**Dwight D. Etheridge** is a Principal, Vice President and Senior Analyst with Exeter Associates, Inc. ("Exeter"), an economics consulting firm specializing in the economics of regulated industry. Mr. Etheridge holds a Bachelor of Science degree in Business Administration from the University of California, Berkeley. He has twenty-three years of experience in the public utility industry. Mr. Etheridge testified on behalf of the Power Plant Research Program of the Maryland Department of Natural Resources. Mr. Etheridge was asked about the need for and alternatives to MAPP considered by PJM<sup>1</sup>.

**Dr. Peter D. Hall** is the President of Metametrics, Inc., of Charlottesville, Virginia, and a consulting economist who specializes in regional economics and socioeconomic impact assessments. Dr. Hall has conducted numerous socioeconomic impact studies for federal, state and private sector organizations for more than twenty-five years. Dr. Hall presented testimony on behalf of the Maryland Department of Natural Resources regarding the socioeconomic, cultural, visual and transportation impacts of the MAPP project.

**Steven P. Harriott** is a Professional Wetland Scientist at Versar, Inc., the Biology Integrator contractor to the Maryland Department of Natural Resources (DNR) Power Plant Research Program (PPRP). His expertise is in the assessment of potential impacts to wetlands and terrestrial systems. Mr. Harriott presented testimony on behalf of the Maryland Department of Natural Resources regarding the ecological resources at risk in Dorchester County from the new transmission line corridor across the county anticipated in the Application.

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<sup>1</sup> PJM is the Regional Transmission Organization (RTO) coordinating the flow of electricity from power plants to distribution companies serving a 13-state area including Delaware, Maryland, and Virginia.

**Peter J. Lanzalotta** is a graduate of Rensselaer Polytechnic Institute, where he received a Bachelor of Science degree in Electric Power Engineering. In addition, he holds a Masters degree in Business Administration with a concentration in Finance from Loyola College in Baltimore. He is a Principal of Lanzalotta & Associates LLC, which was formed in January 2001. Prior to that, Mr. Lanzalotta was a partner of Whitfield Russell Associates, with which he had been associated since March 1982. Mr. Lanzalotta's areas of expertise include electric utility system planning and operation, electric service reliability, cost of service, and utility rate design. He is a registered professional engineer in the states of Maryland and Connecticut. Mr. Lanzalotta testified on behalf of the Office of People's Counsel ("OPC").

**Dr. Hyde Merrill** holds a doctorate in electrical engineering from MIT. He has been an independent consulting engineer since 1998. For the preceding 18 years, he worked as a consultant at Power Technologies, Inc., doing power system planning studies and developing tools for power system planning and operation. Dr. Merrill worked for American Electric Power Service Corporation for seven years after graduating from college. He has been an adjunct professor at Rensselaer Polytechnic Institute and a visiting assistant professor at MIT. Dr. Merrill was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) for contributions to decision analysis considering conflicting objectives and risk in electric power systems. He has published more than 80 technical papers and book chapters, including roughly two dozen on strategic planning in electric power. Dr. Merrill testified about the need for the MAPP project on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc.

**Sandra S. Patty** has been the Manager of Transmission Projects for the Power Plant Research Program (PPRP), Department of Natural Resources since 1991. Ms. Patty received my Bachelor of Science Degree in Biology in 1973 from California State College, and a Masters in Civil Engineering, Energy Resources, in 1983 from the University of Pittsburgh. Prior to joining PPRP, Ms. Patty was employed by Allegheny Power Service Corporation, a member company of Allegheny Power Systems, as an Environmental Analyst from 1974 to 1991. Ms. Patty presented testimony regarding the initial findings and preliminary recommendations based on technical reviews performed by DNR and coordinating State agencies concerning the MAPP project.

**Dr. William Richkus** is the Director of the Ecological Sciences and Applications Division at Versar, Inc., the Biology Integrator contractor to the Maryland Department of Natural Resources (DNR) Power Plant Research Program (PPRP). His expertise is in fisheries biology, resource management, and impact assessment, both terrestrial and aquatic. Dr. Richkus holds a Ph.D. in Oceanography from the Graduate School of Oceanography, University of Rhode Island. He also holds an M.S. in Oceanography from the University of California (San Diego) Scripps Institute of Oceanography. Dr. Richkus present testimony on behalf of the Maryland Department of Natural Resources regarding the ecological resources at risk in the Chesapeake Bay from the submarine cable anticipated in the Application to establish the overall need for MAPP.

**Craig Taborsky** is employed by the Public Service Commission of Maryland (PSC) as an Electric Generation/Transmission Engineer in the Commission's Division of Engineering. Mr. Taborsky has a Bachelors of Science Degree in Engineering from Duke University and a Masters of Science Degree in Electrical Engineering from Johns Hopkins University. He has about 25 years of experience in Electrical Systems Engineering. Mr. Taborsky has worked for the PSC since 2000. Mr. Taborsky testified on behalf of the PSC staff regarding the reliability and stability of the electric system as it might be affected by the applicant's project. He also testified about the need for the MAPP project to meet the existing and future demand for electric service in the area.

### **ISSUES AFFECTING DELMARVA ELECTRIC SERVICE RELIABILITY**

Five of the eight experts testified about the MAPP project with regard to issues affecting the reliability of Delmarva electric service: Dr. Hyde Merrill, Mr. Dwight D. Etheridge, Mr. Peter J. Lanzalotta, Ms. Sandra Patty, and Mr. Craig Taborsky. Following is a summary of the testimony relevant to this issue.

**Summary:** Delmarva electric service meets national reliability criteria until the year 2020 when one of the smaller transmission lines (Townsend-Church 138 kV) may suffer an outage. While MAPP would prevent this outage, the experts who examined this issue identified alternatives to address this and other reliability issues at a fourth to a tenth of the cost of MAPP. These alternatives would also cause far less impact to the Chesapeake Bay as well as other sensitive environmental- and cultural-resources. The experts also pointed out that it is difficult to accurately predict reliability issues more than three- to five-years into the future. Furthermore, extrapolation was used to predict more than half of the reliability issues it is claimed MAPP would resolve. One of the experts explained how extrapolation can be very inaccurate. This expert recommended that far more exacting contingency analyses should be employed. Also, several of the experts cited a failure on the applicants part to factor in declines in energy use which have been occurring since the start of the recession along with anticipated reductions in peak-demand and increased generation.

It is claimed that congestion along existing transmission lines prevents the cheapest electricity from reaching the Delmarva peninsula. This cheaper electricity mostly comes from coal-fired power plants located in the Ohio River Valley. The analyses supporting this claim suffer from the same shortcomings cited above. While MAPP may relieve this congestion the experts also identified alternatives that would achieve this same goal at far less cost to Delmarva customers and with far less impact to the natural and cultural resources which make the peninsula such a great place to live.

Perhaps the most important points to take away from this testimony is that:

- Delmarva does not face an imminent threat of blackouts or other service reliability issues and existing transmission lines have ample capacity to meet needs on the peninsula until at least 2020;

- It is very difficult to predict what issues will affect reliability more than three- to five-years out, much less more than a decade away;
- It is premature to commit to a solution as expensive and intrusive as MAPP given the many uncertainties associated with these long range predictions; and
- There are alternatives for correcting these issues which can be implemented far more quickly at a substantially lower cost to Delmarva customers and the environment.

**Dr. Hyde Merrill** testified on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc. Dr. Merrill’s testimony included Table 1 below summarizing reliability violations alleged in the applicant’s documents justifying the need for MAPP. (Merrill p. 7) In addition to affecting reliability these violations are also alleged to cause congestion that prevents cheaper electricity generated at Ohio River Valley coal-fired power plants from reaching Delmarva consumers.

Alleged Violation	Year	Diagnosed by	Alternatives to MAPP	Cost (millions)
Safe Harbor-Manor 230 kV	2014	contingency evaluation.	standard fix	~\$8.5
Possum Point-Woodbridge 230 kV	2016	extrapolation	standard fix	~\$8.5
Oak Grove-Bowie 045 230 kV	2016	extrapolation	standard fix	~\$8.5
Bowie 045 – Burtonsville 2314 230 kV	2016	extrapolation	standard fix	~\$8.5
Oak Grove-Bowie 042 230 kV	2017	extrapolation	standard fix	~\$8.5
Bowie 042 – Burtonsville 2334 230 kV	2017	extrapolation	standard fix	~\$8.5
Sandy Spring 2334 – High Ridge 230 kV	2019	extrapolation	standard fix	~\$8.5
Sandy Spring 2314 – High Ridge 230 kV	2020	extrapolation	standard fix	~\$8.5
Townsend – Church 138 kV	2020	extrapolation	standard fix	~\$8.5
Mt Storm – Doubs 500 kV	2023	extrapolation	generation	unknown
Rock Springs – Keeney voltage collapse and low voltage in Limerick area	2014	Siemens contingency analysis	update DSM per RPM or 50 Mvar capacitor	\$0 \$1
Rock Springs – Keeney voltage collapse and Peach Bottom – Rock Springs collapse	2014	PJM contingency analysis	update DSM per RPM or 975 Mvar capacitors or redispatch or more generation, DSM or new Peach Bottom-Rock Springs-Keeney line	\$0 \$19.5-35.1 unknown unknown \$193

The violations are of criteria established by the North American Electric Reliability Corporation (NERC)<sup>2</sup> for maintaining the reliability of electric service. The year given in Table 1 is when the applicant alleges the violation will occur. The column headed “Diagnosed By” shows whether the violation resulted from the contingency analysis called for by NERC or far less reliable extrapolations. Note that nine of the 14 violations are predicted through extrapolation. Dr. Merrill provided the following explanation as to why extrapolation is unreliable:

“I do a lot of work with related problems and have published extensively in this area. As part of one study we took 50 data points and estimated the values of others, whose values we actually knew because this was an experiment. (Mukerji et al, “Creating Data Bases for Power System Planning Using High Order Linear Interpolation,” IEEE Transactions on Power Systems, Vol. 3, No. 4, November 1988) Some of these were outside the range that permitted interpolation. We extrapolated for them using a sophisticated approach. The average extrapolation error was 25.7%, much higher than the interpolation errors for the other points.” (Merrill p. 13-14)

The column in Table 1 headed “Alternatives to MAPP” shows seven categories. “Standard fixes” are those routinely used by Delmarva Power & Light and utilities to improve reliability. Dr. Merrill estimated that standard fixes cost an average of about \$8.5 million. DSM is Demand-Side Management to reduce electricity use during peak periods and includes incentives such as paying large users to curtail electricity use on hot, summer afternoons. A capacitor is a device used to maintain or improve transmission line voltage. Mvar is megavar; a unit of capacitor size. The last column provides a rough estimate of the cost of the Alternatives to MAPP, which ranges from \$77 to \$270 million or one-fourth to less than a tenth the \$1.05 billion cost of MAPP.

Note that just one (Townsend-Church 138 kV) of the 14 alleged violations presented in Table 1 is physically located on the Delmarva peninsula. Keeney is a substation located at the northern edge of the peninsula along US Route 40 and appears in two of the alleged violations.

Dr. Merrill was asked: *Do the applicants claim that the power supply to Delmarva is inadequate?* He responded:

“The applicants affirm that the power supply to Delmarva will not violate any reliability criteria through the 15-year planning horizon – the year 2024 – with one minor exception. Beginning in 2020, a single 138-kV line may overload under some contingencies. This problem would not justify the MAPP line, ever. It would not justify building the MAPP line six years earlier, in 2014.” (Merrill p. 7)

Dr. Merrill elaborated as follows:

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<sup>2</sup> For further detail on NERC visit: <http://www.nerc.com>

“I mentioned that the Applicants’ reliability analysis indicated that the Delmarva system meets or exceeds the reliability standards throughout the planning period, with the exception of one 138-kV line that is claimed to overload beginning in 2020, and with the exception of voltage collapse which, if it did occur, could propagate into Delmarva. I will explain why I think that Applicants have found Delmarva to be so reliable.

Table 3 lists the EHV transmission lines that feed Delmarva from two 500-kV transmission stations in the north, Keeney and Red Lion. The table gives the emergency rating for each line. The emergency rating is used in contingency analyses. The table also gives the pre-contingency loading on each of these lines. ***None of the lines is heavily loaded. If any of them failed, there is ample capacity on other lines to pick up the slack, and this apparently is what the Applicant’s study showed.***

Line	Emergency Rating	Base-case flow	
		MW	% of Rating
Keeney-Red Lion	924	266	29%
Red Lion-Cartanza	790	194	25%
Red Lion-Cedar Ck	679	281	41%
Keeney-Steele	695	184	26%
Keeney-Steele	805	248	31%

The Delmarva transmission system’s geometry is quite robust, as is reflected by the results of the Applicants’ reliability studies. Four essentially parallel lines run north-south from Keeney and Red Lion. They are linked at the north by the Keeney-Red Lion 230-kV and 500-kV lines and in about the middle of the peninsula, load-wise, by the Steele-Milford 230-kV line. ***This mesh provides many combinations of parallel and alternate paths between Delmarva loads and the 500-kV system.*** (Merrill p. 25-26)

**Mr. Dwight D. Etheridge** provided the following testimony regarding reliability on behalf of the Maryland Department of Natural Resources. Mr. Etheridge was asked to explain the effect the MAPP project had on the reliability criteria violations on facilities located in the central part of the Delmarva peninsula. His response was:

“The earliest reliability criteria violation identified by PJM in its 2007 RTEP in the central part of the Peninsula occurred on the Ocean Bay – Maridel 69 kV line in 2012. This line is less than four miles in length. In December 2007, after approving the MAPP Project, PJM identified the need to rebuild this line at a cost of \$2.1 million. Clearly, a cost-effective local solution was found. The next earliest reliability criteria violations identified by PJM occurred in 2014 on the Glasgow – Mt. Pleasant and Mt. Pleasant – Middleton Tap 138 kV lines. These lines extend less than ten miles each. In May 2008, PJM estimated the cost to rebuild the Glasgow – Mt. Pleasant line at \$5.7 million. Again, a local solution to a reliability criteria violation was found. A 230/138 kV transformer at the Steele substation was expected to overload in 2018 and a 138/69 kV transformer at

the Easton substation was expected to overload in 2021. PJM's studies indicate that the MAPP Project delays all but one of these violations until sometime after 2022, the end of PJM's planning horizon at that time. The MAPP Project's injection of power into the central part of the Peninsula actually causes the Steele transformer to overload four years earlier, in 2014. It is fair to say that the MAPP Project would resolve four low voltage reliability criteria violations on the central part of the Delmarva Peninsula. ***Nonetheless, the magnitude of the MAPP Project relative to the minor nature of these reliability criteria violations on low voltage equipment represents a gross mismatch of a large solution to a small problem. There would have had to be value elsewhere to justify a \$1.05 billion project.*** [Emphasis added] (Etheridge p. 35-36)

Mr. Etheridge was then asked what other reliability criteria violations in the Delmarva area were identified and what effect did the MAPP project have on them? His response to this question was:

“ The four-mile New Castle – Basin Road 138 kV line in northern Delaware was identified as a reliability criteria violation in 2016 and the MAPP Project pushed that violation back four years. A 230/138 kV transformer at Keeney substation was expected to be contingency overloaded in 2019 and the four-mile Keeney – Glasgow 138 kV line was expected to be contingency overloaded in 2020. The MAPP Project deferred these violations beyond 2022. ***Resolving these relatively minor violations does not require a project with the scope and cost of the MAPP Project.***” [Emphasis added] (Etheridge p. 36)

Mr. Etheridge was also asked about Delmarva reliability resulting from the closure of generating units at the Indian River power plant. Mr. Etheridge responded:

“Indian River Unit 4 is the largest generating unit in the central part of the Delmarva Peninsula at approximately 430 megawatts (“MW”), and Unit 3 is also a large unit at approximately 170 MW. These units are a significant power supply source for the central part of the Peninsula. They represent approximately 38 percent of the generation on the Peninsula south of the Delaware and Chesapeake Canal and 23 percent of the power supply requirements.

Indian River Units 3 and 4 are both coal-fired plants. In September 2007, NRG was ordered to bring these units into compliance with certain environmental restrictions by December 2011 or risk their being shut down. In April 2009, NRG filed for permits to install pollution control equipment on these units. In October 2009, the Delaware Department of Natural Resources and Environmental Control issued a Secretary's Order approving the construction permits to allow these units to continue to operate. I have attached the announcement of this decision to my Direct Testimony as Attachment DDE-3.

When it decided to recommend the MAPP Project in October 2008, PJM management took it upon itself to run sensitivity studies that assumed these units would be retired given the significance of these units to the Peninsula's power supply. Those studies indicated that one HVDC circuit from Calvert Cliffs to the Delmarva Peninsula would not resolve the voltage-related reliability criteria violations with these units retired, and that a second HVDC circuit would be needed. *With the recent announcement that NRG has received its necessary permits, that sensitivity is no longer relevant. The possible need for the second HVDC circuit is no longer supported by concerns over Indian River Units 3 and 4 possibly retiring.*" [Emphasis added] (Etheridge p. 9-10)

**Mr. Peter J. Lanzalotta** testified on behalf of the Office of People's Counsel and made the following statement regarding the Safe Harbor-Manor line, which is a critical link in the system serving Delmarva:

"Based on the Companies' filings in this proceeding, there will be a need for some system reinforcement by 2014, or later. However, the immediacy of this need is called into question because recent economic changes that have reduced electricity consumption, and other relevant factors, have not adequately been incorporated into the planning that underlies the Companies' filing. The PJM study supporting the need for the MAPP project needs to be updated to reflect the most up-to-date information. Such information should be forthcoming in early January 2010." (Lanzalotta p. 37)

**Ms. Sandra Patty** testified on behalf of the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources (DNR). When asked about reliability issues and the overall need for the MAPP project Ms. Patty responded:

"PPRP's understanding of the MAPP Project, from a reliability perspective, has evolved during the course of discovery in this proceeding. The Application materials and testimony appeared to indicate that the MAPP Project, which was originally defined by Applicants and PJM as running from Possum Point to Indian River, resolves certain voltage and thermal based reliability criteria violations, the most pressing and urgent of which involved certain voltage based violations projected to occur in 2013. At the end of July 2009, Applicants amended their Application to reflect recent updates to PJM's RTEP. The application amendment included supplemental direct testimony and exhibits related to the updated RTEP. In summary, the in-service date for MAPP was delayed by one year, to 2014, a significant segment of the MAPP, Indian River to Salem, was no longer considered a currently necessary segment by PJM, and there were a number of changes to the voltage and thermal violations identified by PJM. The original application identified 11 voltage violations projected to first occur in 2013, thus providing the 2013 in-service date for the line. The number of voltage violations dropped from 11 to 2, with the first projected to occur in 2014, thus delaying the in-service date for the line from 2013 to 2014. The original application identified 25 thermal violations projected to first occur in 2018. (Direct Testimony of Paul F. McGlynn, Exhibits PFM-1 and PFM-2) The

number of thermal violations dropped from 25 to 17, with the first thermal violation now projected to occur in 2014. (Supplemental Direct Testimony of Paul F. McGlynn, Exhibits PFM Supplemental-1 and PFM Supplemental-2). ***Further, PPRP learned, through responses to discovery requests, that the segment of MAPP from Calvert Cliffs to Indian River alone, without any of the western shore segments, apparently resolves the two voltage-based reliability criteria violations identified in Applicants' supplemental materials. Also, it is unclear to PPRP at this point whether or how the western shore MAPP Segments relates to any of the reliability violations.***" (Patty p. 19-20)

Ms. Patty offered the following conclusion regarding the applicant's review of alternatives to address Delmarva reliability issues:

"At this time, PPRP does not feel that adequate consideration of alternatives has been provided. ***In DNR's opinion, an alternative solution comparable to the Bay crossing portion of MAPP should be designed to address the voltage based violations and also prudently accommodate load growth on the Delmarva Peninsula.***" [Emphasis added] (Patty p. 21)

**Mr. Craig Taborsky** presented testimony on behalf of Maryland Public Service Commission staff. Mr. Taborsky's testimony included the following general statements regarding Delmarva along with a qualifier:

"PHI has a very aggressive schedule and is committed to an in-service date of 2014. There may be reasons for this schedule to slip, particularly for the Chesapeake Bay crossing which is complex and the portion most at risk. However, I agree with the applicant that the HVDC method for connecting Calvert Cliffs to Vienna and Calvert Cliffs to Indian River is the best technology to use for this project." (Taborsky p. 26-27)

Mr. Taborsky qualified the preceding conclusion as being provisional for the following reason:

"2. Staff expects the other parties to provide engineering testimony with regard to the MAPP project. Staff would like to review this material when it is filed. Historically PJM has experienced import capability limitations into the Baltimore/Washington area as well as onto the Delmarva Peninsula. See applicant's response to DNR Data Request 5-1,2." (Taborsky p. 27-28)

#### **ALTERNATIVES WHICH ARE JUST AS EFFECTIVE AS MAPP**

Four of the five experts provided testimony contrasting the effectiveness of MAPP and other alternatives with regard to Delmarva reliability and electricity cost: Mr. Dwight Etheridge, Mr. Peter Lanzalotta, Dr. Hyde Merrill, and Ms. Sandra Patty. The gist of this testimony is that:

- Alternatives to MAPP exist, such as: standard fixes, Demand-Side Management, increased energy efficiency, increased generation, and upgrading existing transmission lines;
- As shown earlier in Table 1 these alternatives cost a fourth to a tenth of the \$1.05 billion MAPP project yet provide the same benefits;
- The alternatives would be just as effective in resolving reliability issues, perhaps more so in terms of preventing blackouts;
- The alternatives would also relieve the congestion driving up Delmarva electricity prices at a cost substantially below that of MAPP; however
- The applicants have not conducted a reasonable evaluation of the alternatives nor compared the costs and benefits of each with the MAPP project.

**Mr. Dwight D. Etheridge** provided the following testimony regarding alternatives to MAPP on behalf of the Maryland Department of Natural Resources. Mr. Etheridge was asked: *In your opinion, has PJM ever presented an in-depth comparison of the MAPP project with any viable alternatives?* Mr. Etheridge responded:

“It [PJM] has not. It did not do so prior to approving the \$1 billion Project in the 2007 RTEP, and it has not done so since that time. In my opinion, a reasonable alternative to the MAPP Project would need to address two things: a new crossing of the eastern interface, most likely south of Philadelphia, that could be constructed in time to address identified voltage-based reliability criteria violations, or in service later than that, provided an interim solution to these violations could be put into place prior to the in-service date of this new transmission line; and a new transmission circuit into the central part of the Delmarva Peninsula in time to address the specific reliability requirements on the Peninsula, which may not be needed for many years. The possible need for enhancements to the 500 kV transmission system south of Washington, D.C., could be addressed separately.

The transmission line that crossed the eastern interface south of Philadelphia that was considered by PJM prior to approving the MAPP Project was the Kemptown – Rock Springs – Hope Creek 500 kV line. That alternative did not include a transmission circuit into the central part of the Delmarva Peninsula, and may have been dismissed by PJM in large part for this reason. Yet, this alternative easily could have been studied in conjunction with a new transmission circuit into the central part of the Delmarva Peninsula so that a comparison with the MAPP Project could have been made. As far as I can tell, such a comparison was never made. PJM never even presented a cost estimate for Kemptown – Rock Springs – Hope Creek 500 kV line at the time it was considering the MAPP Project in 2006 and 2007.

Since that time, PJM looked at an alternative that could not be constructed in time to address voltage-based reliability criteria violations. And it did so without any showing of whether interim measures could be combined with the alternative to make it truly a viable alternative to the MAPP Project.” (Etheridge p. 50-51)

Mr. Etheridge was then asked: *In your opinion, could applicants and PJM develop a reasonable alternative to the MAPP project for meeting the electrical needs for the Delmarva peninsula?*  
Mr. Etheridge responded:

“Yes. That plan might include additional 230 kV lines with various in-service dates spread out over many years. Those lines may not necessarily need to extend all the way south to Vienna and Indian River, initially. The plan might also include investments in and around the Keeney and Red Lion substations, including the possibility of building a new substation, to increase the reliability of the delivery system serving the Delmarva Peninsula. The plan might also identify if and when a 500 kV system into the central part of the Peninsula may be needed under various load growth projections. Cost estimates for this plan, and the timing of when investments might need to be made, and an evaluation of environmental and socioeconomic impacts, would allow for a comparison with the MAPP Project. That comparison may indeed show that the benefits of the MAPP Project justify an investment that may be higher than the cost for a potentially viable alternative.” (Etheridge p. 53)

Mr. Etheridge was asked about stringing new 500 kilovolts circuits along the existing transmission line running from Peach Bottom nuclear power plant to Rock Springs in eastern Cecil County to Keeney in northern Delaware, near US Route 40. Mr. Etheridge’s response was:

“The cost for a second Peach Bottom – Rock Springs – Keeney 500 kV transmission line will likely be at least \$193 million and most likely will cost more than that. This line would also cross the eastern interface, and it would solve the immediate reliability criteria violations associated with voltage collapse in 2014. However, PJM believes based upon representations from BGE that this line would require eight years to construct, pushing its in-service date beyond 2014, the year that PJM is projecting an unacceptable risk of voltage collapse and possible blackouts.

Care should be taken, though, in comparing transmission alternatives and the cost of alternatives because different transmission configurations can provide different benefits. The Peach Bottom – Rock Springs – Keeney 500 kV AC line and the first of the MAPP Project’s HVDC circuits are comparable in that either would solve the voltage-based reliability criteria violations if placed in 2014. The first of the HVDC circuits has the added benefit of providing a new transmission circuit into the central part of the Delmarva Peninsula, albeit six years or more before it is needed. In that regard, the first of the HVDC circuits provides some additional benefit when compared with the Peach

Bottom – Rock Springs – Keeney line. *It also is more than double the cost. An additional negative aspect of the HVDC circuit in this comparison is the fact that its capacity rating may be only one-third the rating of the Peach Bottom – Rock Springs – Keeney 500 kV line.*” (Etheridge p. 12)

Mr. Etheridge also testified in response to several questions regarding the need for a major (backbone) 500 kilovolt (kV) transmission line on the Delmarva peninsula. In response to the question: *At the time PJM approved the MAPP project were there any 500 kv transmission lines extending into the central part of the Delmarva peninsula?* Mr. Etheridge responded:

“No. The MAPP Project, if constructed, would be the first.” (Etheridge p. 44)

When asked *Why is that?* Mr. Etheridge explained:

“The central part of the Delmarva Peninsula in the 2006 and 2007 time frame did not have an immediate need for a 500 kV transmission line, and it does not today. Existing generation on the Peninsula combined with transfer capability over existing and recently enhanced transmission lines from the northern part of the Peninsula provide sufficient and reliable power supply to the central part of the Peninsula. The earliest reliability criteria violation identified by PJM in its 2007 RTEP on a transmission facility on the Peninsula occurred in 2012 on a 69 kV line that PJM indicated could be solved for \$2.1 million.<sup>61</sup> Other 138 kV violations also could be resolved without the need for a regional solution. Simply put, PJM had not in 2007 identified when the next 230 kV or higher transmission line into the central part of the Delmarva Peninsula was needed.” (Etheridge p. 44)

The last question posed to Mr. Etheridge regarding the need for a line as large as MAPP was: *In your opinion, is a backbone transmission line needed to address the needs of the delmarva peninsula?* Mr. Etheridge responded:

“At some point in the future, it is likely that the Delmarva Peninsula may need an additional transmission circuit into the central part of the Peninsula to complement the Peninsula’s existing sources of power supply. Those existing sources of supply include existing generation located in the central and southern portions of the Peninsula, and transfer capability over existing and recently added 230 kV transmission lines from northern Delaware into the Peninsula.

The 2007 RTEP states that “the transmission system on the Delmarva Peninsula is quickly reaching the point where the reliability improvement that incremental ‘band-aid’ solutions can offer are being exhausted.” The most recently added 230 kV transmission circuit into the Peninsula was not a “band-aid” solution, nor would the next 230 kV transmission circuit, if needed, be a “band-aid” solution. It should not be taken as a given

that a higher voltage transmission line is superior to a lower voltage solution that adequately and reliably meets the needs of a region.” (Etheridge p. 44-45)

**Mr. Peter J. Lanzalotta** testified on behalf of the Office of People’s Counsel. When asked to summarize his conclusions regarding analyses of alternatives, Mr. Lanzalotta responded:

“The Companies have yet to submit a siting filing or a CPCN application, which they state that they intend to file at some later, but unspecified, date for that portion of the MAPP Project which is to start at the Calvert Cliffs Substation and proceed east, underwater across the Chesapeake Bay to a new substation at Vienna, and then continue on to the east to the Delaware state line. Until the Companies submit such siting filing and application, there is information missing that is vital to determining whether the MAPP Project is actually the best choice for reinforcing the transmission system. Depending on the choices made in siting the line and in mitigating its impact, the MAPP Project could be much more expensive and take longer to construct than the Companies and PJM have estimated. It is premature to decide that MAPP is needed to the exclusion of other alternatives.” (Lanzalotta p. 6)

Mr. Peter J. Lanzalotta testified on behalf of the Office of People's Counsel and offered the following testimony regarding the effects of MAPP on consumer electricity savings and costs:

“Based on the results of the updated market efficiency study that ***reported only the most favorable scenario***, the Pepco Zone would realize \$11 million in decreased annual consumer payments but would see an equal increase in costs from the cost of MAPP of \$11 million. The Delmarva zone would see a decrease in annual consumer payments of \$13 million with an annual increase of \$7 million related to the cost of the MAPP Project.

The \$240 million annual cost of MAPP is higher than the range of ICF-projected reduction in consumer payments to the PJM RTO of \$66-\$180 million in the original analysis and the \$179 projection from the updated analysis. The relationship of the costs to the benefits would change dramatically if PJM’s socialization of backbone costs is changed as a result of the reconsideration currently being undertaken by the FERC as a result of the Seventh Circuit’s recent reversal and remand pertaining to this issue.” (Lanzalotta p. 16-17)

With respect to how MAPP will affect Delmarva electricity cost Mr. Lanzalotta testified:

“The studies of the economic benefits prepared by the Companies ***shows that projected costs from MAPP will be greater than the projected potential benefits***. No separate estimates of benefits and costs were prepared for the individual segments of MAPP. If recent challenges to the socialization of high voltage transmission costs across all of PJM become policy, then the Companies’ customers could see higher costs from MAPP than reflected in these studies.” (Lanzalotta p. 7)

“Project cost for the MAPP Project should be considered, relative to the costs for alternative approaches to addressing reliability violations, when determining whether MAPP is needed.” (Lanzalotta p. 7)

**Dr. Hyde Merrill** testified on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc. When asked: *Do you believe that applicants have demonstrated a need for the MAPP line, based on your review?* Dr. Merrill responded:

“The Commission should deny approval and certification of the MAPP project because the Applicants have not demonstrated the need for this project. In fact, it seems quite clear that Applicants have not introduced sufficient evidence that the project is needed. To the contrary the preponderance of the evidence demonstrates that it is not needed.

In addition, the claimed needs, if they are real, have alternative solutions that:

- Are much less expensive,
- Much less intrusive, and
- Will make the power system more secure.” (Merrill p. 4)

Dr. Merrill gave the response to questions regarding alternatives for addressing one of the two reliability issues: Voltage collapse.

“Other alternatives, if the voltage collapse occurred under updated assumptions, include modest redispatching of generation, adding a new Peach Bottom – Rock Springs – Keeney 500-kV line (which would not necessarily cause the thermal overloads cited by the applicants), encouraging new generation and DSM in eastern PJM, etc.” (Merrill p. 6)

Dr. Merrill’s provided the following testimony about whether MAPP would may make Delmarva electric service more or less secure:

“Perhaps, in one sense. Carrying two or three spare tires, as was done a century ago, would make driving an auto more reliable today, too. But most of us have decided that one spare is adequate. ***PJM has determined that the supply to Delmarva meets or exceeds all relevant reliability criteria until 2020 when, as noted above, a minor violation occurs.*** But in another sense ***MAPP would make the regional power system, including Delmarva, more brittle, more susceptible to cascading blackouts.*** Building the MAPP line is part of a PJM strategy, first enunciated to my knowledge in 2005, for bringing western power to eastern markets (especially the New York City area) from

western PJM. The purpose of this strategy is to increase the west-to-east transfers. *Most if not all major cascading blackouts have occurred when interregional transfers were high.*" (Merrill p. 8)

**Ms. Sandra Patty** testified on behalf of the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources (DNR). When asked about the status of PPRP's review of the MAPP project, Ms. Patty responded:

"PPRP has not yet completed its review of all three aspects of the MAPP project (two modifications and the overall need of the project). In July, 2009, the Applicant filed additional information significantly changing the scope of the project as well as a change of the in-service date. Through a series of data requests and technical meetings, PPRP has been trying to discern the implications of these changes, but as yet DNR has not come to a determination as to whether this project is the best means of meeting reliability concerns while minimizing impacts to Maryland's natural resources." (Patty p. 7)

"At this time, PPRP does not feel that adequate consideration of alternatives has been provided. In DNR's opinion, an alternative solution comparable to the Bay crossing portion of MAPP should be designed to address the voltage based violations and also prudently accommodate load growth on the Delmarva Peninsula." (Patty p. 20)

"Based on our review of the application and associated environmental information, DNR has concluded that the proposed MAPP facility may not be the most appropriate solution to meet reliability concerns while minimizing impacts to Maryland's valuable natural and cultural resources. There is a lack of evidence that adequate consideration was given to other potentially less costly and far less resource impacting alternatives." (Patty p. 24)

**Mr. Craig Taborsky** included the following comment in his testimony on behalf of the Maryland Public Service Commission staff.

"PHI has a very aggressive schedule and is committed to an in-service date of 2014. There may be reasons for this schedule to slip, particularly for the Chesapeake Bay crossing which is complex and the portion most at risk." (Taborsky p. 27)

Several of the experts felt that a viable alternative to MAPP exists in the form of stringing new transmission circuits of the same size as MAPP along the existing transmission right-of-way running from Conastone (in northwest Harford County) or Peach Bottom nuclear power plant to Rock Springs in western Cecil County to Keeney in northern Delaware. The applicants dismissed this alternative because:

"PJM believes based upon representations from BGE that this line would require eight years to construct, pushing its in-service date beyond 2014, the year that PJM is

projecting an unacceptable risk of voltage collapse and possible blackouts.” (Etheridge p. 12)

A bit more detail on why this alternative requires eight years to complete was provided by the applicants in the following response to Maryland Department of Natural Resources Data Request 3-26:

“As it does for all transmission line time completion estimates, the estimates PJM received for MAPP and Conastone-Peach Bottom were based on information provided by engineering staff from the respective transmission owners who bear the obligation to build. Those estimates are based on such variables as engineering, construction, right-of-way acquisition, and state regulatory approvals.”

Given Mr. Taborsky’s concerns about delay resulting from the complexity of bringing MAPP across the Bay the Peach Bottom-Rock Springs-Keeney alternative may require no more or even less time to complete. At a minimum the applicants should thoroughly examine this question before dismissing an alternative which is far less expensive (\$290 million vs. \$1.05 billion) and causes far less impact to environmental and cultural resources.

#### **EFFECT OF MAPP & ALTERNATIVES ON DELMARVA ELECTRICITY COSTS**

Four of the expert witnesses testified regarding the effect of MAPP and possible alternatives on the cost Delmarva customers would pay for electricity: Mr. Dwight Etheridge, Dr. Hyde Merrill, Mr. Peter Lanzalotta, and Ms. Sandra Patty. MAPP and other alternatives may reduce cost by relieving congestion which prevents the cheapest electricity - that from coal-fired power plants - from reaching Delmarva customers. However, in the case of MAPP a net savings is predicated upon the most favorable of four possible scenarios. If this most favorable scenario fails to unfold then MAPP may have no effect or even drive up monthly Delmarva electricity bills. Also, pending court action may reverse the current practice of spreading the cost of MAPP across 13 states to just a few. Of course this would result in the costs of MAPP to further overwhelm the savings. In contrast, the experts identified alternatives which also relieve congestion, but a one fourth- to one-tenth the cost of MAPP. These far cheaper alternatives are much more likely to provide Delmarva residents with a net reduction in their monthly electricity bills.

**Mr. Dwight Etheridge** was asked about stringing new 500 kilovolts circuits along the existing transmission line running from Peach Bottom nuclear power plant to Rock Springs in eastern Cecil County to Keeney in northern Delaware, near US Route 40. Mr. Etheridge’s response was:

“The cost for a second Peach Bottom – Rock Springs – Keeney 500 kV transmission line will likely be at least \$193 million and most likely will cost more than that. This line would also cross the eastern interface, and it would solve the immediate reliability criteria violations associated with voltage collapse in 2014. However, PJM believes based upon representations from BGE that this line would require eight years to construct, pushing

its in-service date beyond 2014, the year that PJM is projecting an unacceptable risk of voltage collapse and possible blackouts.

Care should be taken, though, in comparing transmission alternatives and the cost of alternatives because different transmission configurations can provide different benefits. The Peach Bottom – Rock Springs – Keeney 500 kV AC line and the first of the MAPP Project’s HVDC circuits are comparable in that either would solve the voltage-based reliability criteria violations if placed in 2014. The first of the HVDC circuits has the added benefit of providing a new transmission circuit into the central part of the Delmarva Peninsula, albeit six years or more before it is needed. In that regard, the first of the HVDC circuits provides some additional benefit when compared with the Peach Bottom – Rock Springs – Keeney line. ***It also is more than double the cost. An additional negative aspect of the HVDC circuit in this comparison is the fact that its capacity rating may be only one-third the rating of the Peach Bottom – Rock Springs – Keeney 500 kV line.*** (Etheridge p. 12)

**Mr. Peter J. Lanzalotta** testified on behalf of the Office of People’s Counsel. When asked to summarize his conclusions regarding analyses of alternatives, Mr. Lanzalotta responded:

“The Companies have yet to submit a siting filing or a CPCN application, which they state that they intend to file at some later, but unspecified, date for that portion of the MAPP Project which is to start at the Calvert Cliffs Substation and proceed east, underwater across the Chesapeake Bay to a new substation at Vienna, and then continue on to the east to the Delaware state line. Until the Companies submit such siting filing and application, there is information missing that is vital to determining whether the MAPP Project is actually the best choice for reinforcing the transmission system. ***Depending on the choices made in siting the line and in mitigating its impact, the MAPP Project could be much more expensive and take longer to construct than the Companies and PJM have estimated. It is premature to decide that MAPP is needed to the exclusion of other alternatives.***” (Lanzalotta p. 6)

With respect to how MAPP will affect Delmarva electricity cost Mr. Lanzalotta testified:

“The studies of the economic benefits prepared by the Companies ***shows that projected costs from MAPP will be greater than the projected potential benefits.*** No separate estimates of benefits and costs were prepared for the individual segments of MAPP. If recent challenges to the socialization of high voltage transmission costs across all of PJM become policy, then the Companies’ customers could see higher costs from MAPP than reflected in these studies.” (Lanzalotta p. 7)

“Project cost for the MAPP Project should be considered, relative to the costs for alternative approaches to addressing reliability violations, when determining whether MAPP is needed.” (Lanzalotta p. 7)

Mr. Lanzalotta offered the following additional detail regarding the effects of MAPP on consumer electricity savings and costs:

“Based on the results of the updated market efficiency study that ***reported only the most favorable scenario***, the Pepco Zone would realize \$11 million in decreased annual consumer payments but would see an equal increase in costs from the cost of MAPP of \$11 million. The Delmarva zone would see a decrease in annual consumer payments of \$13 million with an annual increase of \$7 million related to the cost of the MAPP Project.

***The \$240 million annual cost of MAPP is higher than the range of ICF-projected reduction in consumer payments to the PJM RTO of \$66-\$180 million in the original analysis and the \$179 projection from the updated analysis. The relationship of the costs to the benefits would change dramatically if PJM’s socialization of backbone costs is changed as a result of the reconsideration currently being undertaken by the FERC as a result of the Seventh Circuit’s recent reversal and remand pertaining to this issue.***” (Lanzalotta p. 16-17)

**Dr. Hyde Merrill** testified on behalf of Dorchester County, Dorchester Citizens for Safe Energy, the Eastern Shore Land Conservancy, and NRG Energy, Inc. Dr. Merrill was asked: *Do you believe the applicants have demonstrated a need for the MAPP line, based on your review?* Dr. Merrill responded:

“No. The Commission should deny approval and certification of the MAPP project because the Applicants have not demonstrated the need for this project. In fact, it seems quite clear that Applicants have not introduced sufficient evidence that the project is needed. To the contrary the preponderance of the evidence demonstrates that it is not needed.

In addition, the claimed needs, if they are real, have alternative solutions that:

- *Are much less expensive,*
- Much less intrusive, and
- Will make the power system more secure.” (Merrill p. 3)

Dr. Merrill also testified that:

“Applicants’ economic analysis of the claimed ratepayer “benefit” of the line is incomplete. ***Even this incomplete analysis shows that what the ratepayer will pay for the line is more than his economic benefit from it.***

***Previous and more complete analyses by PJM indicate that the ratepayer costs may go up even more than Applicants present in this case. Furthermore, neither PJM nor the Applicants have attempted to assess the effect of this line on the competitive power markets.*** (Merrill p. 8)

Dr. Merrill agreed with Mr. Etheridge that the applicant used the most favorable scenario in concluding that MAPP would reduce Delmarva electric costs:

“PJM claims that the MAPP line will provide a net benefit to the ratepayer. In his Supplemental Direct Testimony Mr. Colliston claims that reduction in congestion will allow the generation to be dispatched more efficiently and that the resulting production cost savings are a “consumer benefit” of \$73 million in a test year. He also calculates that the reduction in congestion will reduce “consumer payments” throughout PJM by \$199 million in a test year.

These numbers apparently result from the ***most optimistic of four sets of assumptions*** described in Mr. Colliston’s original direct testimony.” (Merrill p. 27)

Dr. Merrill then offered the following testimony in hopes of explaining the many complexities involved in determining the actual effect of MAPP on the price Delmarva electric customers would pay. He cited two reasons for disagreeing with the applicants assertion of a decrease in cost.

“First, he [Mr. Colliston, the applicants expert] does not recognize the cost of the line itself, which must be paid by the ratepayers. PJM generally uses a levelized fixed cost carrying charge rate of 20% of the capital investment per year. That is, if the MAPP line cost \$1.2 billion, then the average annual carrying charge is \$240 million. This is analogous to a home mortgage payment; it includes both capital and the equivalent of mortgage interest. Mr. Kamerick agrees with this number; see p. 2 of his Supplemental Testimony. ***That cost exceeds Mr. Colliston’s supposed savings in “consumer payments” under his most optimistic assumptions.***

The second is more technical. Mr. Colliston assumes that any reduction in nominal “consumer payments” because of reducing congestion will go to the ratepayer. This is incorrect because of a mechanism in PJM’s accounting system. It has to do with marginal cost or spot pricing, the basis for wholesale energy prices in PJM’s real-time market. This mechanism, sometimes called “congestion cost” and sometime ‘FTR rebate,’ is a hedge to the consumer against high costs due to congestion. When congestion occurs, and the local spot price of electricity is high, unbeknownst to the consumer, the local power company passes rebate to the customer. This is all handled invisibly by the PJM accounting system. (This description assumes no bilateral deals have been made by the local power company, supposedly with the objective of saving the customer even more than this rebate would save.) When congestion goes away, for instance because of a new

line, so does the invisible rebate. The reduction in the rebate may be greater than the reduction in nominal ‘consumer payments.’ If it is, then the ratepayer’s costs will actually go up. Computing the effect of a new line on the FTR rebate is difficult. PJM did it for the TrAIL line. See PJM TEAC report 20070221-item-07-market-efficiency-analysis -results. In a 2010 test year, the effect of the line was to reduce nominal consumer payments by \$621 million. But the reduction in the FTR rebate was \$790 million. So the net effect on the ratepayer was an increase of \$169 million for the year. The Applicants have not mentioned this effect. The Applicants have not computed this effect for the MAPP project. I do not have the data or the software to do it. But the analysis of the economic effect on the ratepayer of the line is incomplete without it.” (Merrill p. 28-29)

**Ms. Sandra Patty** testified on behalf of the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources (DNR) about the need for the Maryland Public Service Commission to direct the applicants to conduct a thorough study of alternatives to MAPP to determine the most cost-effect solution.

“The Commission should direct the Applicants to provide, as quickly as possible, studies that demonstrate that the MAPP Project is superior to a reasonably comparable alternative that: resolves voltage collapse; and provides incremental transfer capability into the central Delmarva Peninsula in a prudent and cost-effective manner, and on a timetable consistent with when this capability is needed. Impacts to environmental and socioeconomic resources should be included as a factor in weighing the relative merits of the alternatives to determine the most appropriate solution.” (Patty p. 23)

## **IMPACTS TO SENSITIVE ENVIRONMENTAL & CULTURAL RESOURCES**

Three of the eight experts testified about the impact of the MAPP project to the Chesapeake Bay as well as sensitive cultural and environmental resources of Dorchester County.

### **Chesapeake Bay**

Dr. William Richkus presented testimony on behalf of the Maryland Department of Natural Resources regarding the impact of burying the MAPP transmission line cables beneath the Bay between Calvert Cliffs and Dorchester County. He described the proposed approach for laying the cables as follows:

“Pepco has proposed crossing Chesapeake Bay via a set of submarine cables that would require up to a 600-foot right-of-way (ROW). Pepco has indicated that cable spacing is equal to water depth. Thus at 100-foot depths, the ROW would be up to 600 ft wide to accommodate the proposed 6 cables. This width would narrow in shallower water as the cables approached the shoreline. Pepco has not submitted siting information with its MAPP Need Application. Therefore, I cannot determine the exact location. Based on Pepco’s public statements, the general description of the MAPP project, and other information provided to PPRP, it is my understanding that the submarine crossing will most likely be between Calvert Cliffs and Taylor’s Island. Other routes in the same

general vicinity have been discussed, including continuing the submarine cables along and under the Little Choptank River.” (Richkus p. 3)

“Given the distance across the bay and the depths that will be encountered, it is anticipated that the submarine cables would be installed in trenches in the bottom sediment created by water jetting or mechanical plowing. Pepco described the techniques that would be used in response to DNR Data Request 3-49 of these proceedings. The cable could be installed in a trench up to 10-15 feet deep depending on local sediment characteristics. During the plowing and installation process, the bottom sediment will be displaced from the trench and potentially suspended in the water column, during up to six passes across the entire Bay. According to Pepco's material, it is expected that the material displaced by the plowing operation would subsequently fill in around the cable in the excavated trenches over time as a result of normal sedimentary processes. Depending on the trenching method used and the degree to which the sediment is fluidized or dispersed by currents, it is possible that mounds of displaced sediment would remain along the sides of the trench for an extended period.” (Richkus p. 3-4)

Dr. Richkus presented the following short- and long-term impacts to the Chesapeake Bay which may result from the cable installation:

“There will be a number of environmental modifications during installation that would be short-term in nature. Sediment will be removed from the cable locations within the ROW and be deposited in adjacent areas. Sediment plumes created by the trenching activity may result in sediment transport and deposition in other locations, release of sequestered nutrients, and reductions in dissolved oxygen. The sediment plumes would also result in localized increases in turbidity and total suspended solids. Longer-term impacts will result from the placement and operation (i.e., electrical transmission through the cables) of the cables, including the creation of a physical barrier to movement by some species, locally high electromagnetic fields near the cable, and strips of permanently heated sediment across the width of the Bay. A particular concern is that continuously operating buried cables reach temperatures of 90 degrees C [194°F] and can create zones of elevated sediment temperature significantly above ambient conditions tens of feet from the cable, depending on sediment thermal characteristics.” (Richkus p. 3-4)

Dr. Richkus expanded upon the short-term impacts by stating:

“Construction will result in removal of sediment from trenched areas and deposition of that sediment in adjacent habitat. Such actions will dislodge and disturb benthic organisms in the sediment and likely cause direct mortality. Deposition may result in smothering of some sensitive benthic organisms. Increased turbidity and decreased dissolved oxygen that may occur in the turbidity plume during construction may harm planktonic organisms and fish. Although there are no significant biological resources in the deep center portion of the Bay (below 12m depth), because it frequently experiences

very low dissolved oxygen, re-suspension of sediments from this area could exacerbate oxygen depletion. Resuspension of nutrients as a result of trenching could increase nutrient levels in the water column, contributing to algal blooms that are the primary cause of oxygen depletion in the Bay.” (Richkus p. 6)

Dr. Richkus provided the following detail regarding long-term impacts:

“Transmission of electricity results in heating of the cable, and a continuous release of this heat to the surrounding sediment. The typical operating temperature of a submarine cable will be 90 degrees C (Pepco response to DNR Data Request 3-49, Appendix C) and each cable, based on estimates for other installations, will generate 10s of watts of heat per linear foot. The spatial extent of elevated temperatures that may result from cable operation is dependent on the sediment composition, but increases in temperature of 10 or more degrees C are possible at distances of 20 to 30 ft from the cable (based on models for the SMECO Patuxent River crossing), that is at the surface for a cable buried less than 20 feet deep. Regions directly adjacent to the cable would be uninhabitable and the increased temperature at greater distances could affect normal behavior and life cycles of some species. The heat generated by the 6-9 cables distributed across the width of the right of way will accumulate and create an anomalously 1 warm strip of bottom hundreds of feet wide. Biological effects of elevated temperature may include changes in metabolism, shifts of spawning periods, or attraction to/avoidance of the warm habitat. Electric transmission also creates electromagnetic (EMF) fields which are known to affect the behavior of some fish, such as eels, rays and sharks. The creation of irregular bottom topography in an area of the Bay bottom that is normally flat might affect the movements of species, such as blue crabs and fish species, through the area.” (Richkus p. 6-7)

Dr. Richkus was asked how these impacts could be avoided. He responded:

“Given that some environmental perturbations from cable installation are short term, timing of construction so that it takes place when sensitive species are least likely to be present would be critical. Establishing locations of particularly important habitats, such as oyster beds and SAV prior to installation could allow for routing to minimize impacts. However, based on the biological resources at risk and likely affects of the cable, there is potential for permanent impacts to the aquatic environment that may be substantial, in which case a consideration of alternate routes that would avoid the Bay crossing would be appropriate. However, at this time Pepco has not identified such alternative routes in a way that would provide any basis for making a comparative analysis of impacts.” (Richkus p. 7)

### **Dorchester County Environmental Impacts**

Mr. Steven P. Harriott testified on behalf of the Maryland Department of Natural Resources regarding the “wetlands, streams, forests, threatened and endangered species, and other natural

resources in Dorchester County that are subject to impacts should the part of the MAPP project proposed to go through Dorchester County be constructed.” (Harriott p. 1)

When asked to summarize his findings regarding Dorchester County natural resources at risk, Mr. Harriott responded:

“Pepco has indicated during pre-application meetings its intention to construct new transmission facilities and rights-of-way (ROWs) through Dorchester County as part of its proposed MAPP project. The distance from the Chesapeake Bay shore (Taylor Island) to the Vienna substation is approximately 27 linear miles, and the standard ROW width for a high-voltage transmission line of the proposed capacity would be 200 feet. Although the route has not been specified, construction of this magnitude in Dorchester County, even if done using environmentally sensitive practices, would likely impose impacts to natural resources, such as tidal and nontidal wetlands, forests, and rivers and streams, given the extensive scope of such resources in the county. Similarly, the types of wetlands found throughout Dorchester County often provide known habitat for threatened and endangered flora and fauna, thus there could also be adverse impacts to these resources.” (Harriott p. 1-2)

With regard to the extent of wetlands in Dorchester County and the relative magnitude-importance when compared to the rest of Maryland, Mr. Harriott testified:

“There are a total of approximately 169,168 acres of tidal and nontidal wetlands currently existing in Dorchester County; this is equivalent to about 44.6 percent of the total land area of the county. Approximately 39 percent of the total area of the county comprises tidal wetlands. Dorchester County possesses many more wetlands per unit land area by far than any other county in Maryland. Many of these wetlands in the southern and southwestern parts of the county compose the Blackwater National Wildlife Refuge. A large proportion of these wetlands in the coastal part of the county are also within the protected Chesapeake Bay Critical Area. Because of its location in the coastal plain, Dorchester County possesses numerous flat, broad rivers and streams, often with complex, wide braided channels. These systems are frequently associated with extensive areas of adjacent wetlands. In addition, there are a number of Wetlands of Special State Concern throughout Dorchester County. These wetlands often provide known habitats for listed threatened and endangered flora and fauna.” (Harriott p. 2)

Mr. Harriott presented the following testimony regarding the river, stream, and wetland impacts of constructing an overhead MAPP transmission line across 27 miles of Dorchester County:

“Even if environmentally sensitive siting and construction methods are utilized, it would not be possible to construct an approximately 27-mile-long corridor through the County without causing adverse impacts to important tidal and nontidal wetlands. This is principally because of the sheer size, width, and extent of these features, most of which

are associated with broad coastal plain rivers and streams. Further, access to many of these areas by vehicle is extremely limited, as there are very few existing roads. Almost any route across the county would require that some of the proposed facilities would have to be constructed directly in wetlands, and other impacts would result from construction of new access roads, equipment laydown areas, and other facilities. Because wetlands in this region are frequently interconnected and form an extended habitat for many species, the loss or degradation of a significant amount of wetland may have collateral effects on nearby protected areas, including Maryland-designated Wetlands of Special State Concern and the Blackwater National Wildlife Refuge.” (Harriott p. 3)

And with regard to forest impacts Mr. Harriott testified:

“Much of Dorchester County is forested; forest covers more than a third of the entire land area of the county. The vast majority of the county land area consists of either wetlands or forest. In addition, the county currently has approximately 11,000 acres of forested wetlands. These forested habitats are perhaps the most vulnerable natural resource where new transmission line projects are constructed. Such construction permanently converts forested habitats to herbaceous and shrub habitats that are usually less ecologically valuable.

Transmission line ROWs also often bisect large tracts of 1 forest, possibly leaving the remaining parcels below minimum patch sizes for forest interior wildlife and plants that need large, unbroken tracts of forest for their life requirements. The ROWs through forest habitat can also provide corridors for invasive flora and fauna to colonize forest edges, to the detriment of native species.” (Harriott p. 3-4)

Finally, Mr. Harriott was asked whether threatened or endangered species were present in Dorchester County and how the MAPP project may affect these highly-sensitive species:

“Specific adverse effects to threatened and endangered flora and fauna cannot be determined at present, as the route of the proposed project through the county is still unknown. There are, however, a total of about 114 listed threatened and endangered species of plants and animals currently known to exist in Dorchester County. Many of these species exist in and near the kinds of wetland, aquatic, and forested habitats that would be negatively affected by the proposed project. Populations of threatened and endangered species are typically localized; recent information is often not available on the current status of many species of concern. Given the length of the proposed project, and the abundance of important habitats, it is likely, in my opinion, that some populations of listed threatened and endangered flora and fauna would be placed at risk by constructing the Dorchester County portion of the proposed project.” (Harriott p. 4)

When asked about the potential impacts of extending the MAPP transmission line across Dorchester County, Ms. Patty responded:

“The Applicants have indicated its intention to construct new transmission facilities and ROWs for approximately 27 linear miles in a 200 foot-wide ROW through Dorchester County as part of its proposed MAPP project. Although the route has not been specified, construction of this magnitude in Dorchester County would likely encounter and place at risk considerable areas of critical natural resources such as tidal and nontidal wetlands, forests, and rivers and streams. A new ROW would also likely place state and federal listed threatened and endangered flora and fauna at risk for adverse impacts.” (Patty p. 19)

Ms. Patty presented testimony on behalf of the Maryland Department of Natural Resources (DNR). Ms. Patty offered the following conclusion regarding the environmental and cultural resources impacts of the MAPP project and the need to thoroughly consider alternatives:

“Based on our review of the application and associated environmental information, DNR has concluded that the proposed MAPP facility may not be the most appropriate solution to meet reliability concerns while minimizing impacts to Maryland’s valuable natural and cultural resources. There is a lack of evidence that adequate consideration was given to other potentially less costly and far less resource impacting alternatives.” (Patty p. 24)

### **Dorchester County Cultural Impacts**

Dr. Peter D. Hall presented testimony on behalf of the Maryland Department of Natural Resources regarding the socioeconomic and cultural impacts of the MAPP transmission line. Most of Dr. Hall’s testimony focused on the Southern Maryland (Western Shore) portion of MAPP where the applicants have presented a specific route for the transmission. While a specific route has not been proposed for the Eastern Shore segment, Dr. Hall presented the following regarding the socioeconomic impacts of building MAPP in Dorchester County:

“Pepco has indicated its intention to construct new transmission facilities and ROWs<sup>3</sup> for approximately 27 linear miles in a 200 foot-wide ROW through Dorchester County as part of its proposed MAPP project. Because a route has not been specified, I have not undertaken a detailed assessment of potential socioeconomic effects from construction and operation of the line. However, I am cognizant of significant cultural and heritage resources in Dorchester County that could be affected and am aware of a number of issues that have been raised by interested parties, including the Dorchester County Council and Dorchester Tourism Department, on potential impacts. Resources potentially at risk include the proposed Harriet Tubman National Historic Park, a potential National Historic Landmark; the Heart of Chesapeake Country, a Maryland Heritage Area; and numerous other cultural and recreational resources. In previous proceedings before this Commission, I have testified that cultural heritage tourism is the economic component of most heritage initiative at the local, State and national levels. As such, impact to heritage

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<sup>3</sup> ROW = Right-Of-Way.

resources from the proposed transmission line could affect the Dorchester and Eastern Shore economies, as well.” (Hall p, 14)