BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF DELAWARE

IN THE MATTER OF INTEGRATED RESOURCE PLANNING FOR THE PROVISION OF STANDARD OFFER SERVICE BY DELMARVA POWER & LIGHT COMPANY UNDER 26 *DEL. C.* §1007(c) & (d)	)))))	**PSC DOCKET NO. 10-2**

ORDER NO. 8083

AND NOW, this 10th day of January, 2012:

WHEREAS, on December 1, 2010, Delmarva Power & Light Company ("Delmarva") filed with the Delaware Public Service Commission ("the Commission") its Integrated Resource Plan ("IRP") as required under the Electric Utility Retail Customer Supply Act of 2006 ("EURCSA"), 26 *Del. C.* §1006 *et seq.*; and

WHEREAS, on or before May 31, 2011, the Public Service Commission Staff ("Staff'), the Division of the Public Advocate ("DPA"), the Department of Natural Resources and Environmental Control ("DNREC"), the Caesar Rodney Institute ("CRI"), NRG Energy ("NRG"), Calpine Corporation ("Calpine"), Mid-Atlantic Renewable Energy Coalition ("MAREC"), the Delaware Energy Users Group ("DEUG"), the Sierra Club ("Sierra Club") and the Retail Energy Supply Association ("RESA") filed comments on the IRP; and

WHEREAS, two interested non-intervenor participants – the Delaware Nurses Association and John Greer, Jr., P.E. – also filed comments on May 31, 2011; and

WHEREAS, on or before July 29, 2011, Delmarva filed a reply to the comments submitted by the aforementioned participants; and

WHEREAS, the designated Hearing Examiner deemed evidentiary hearings and briefing unnecessary; and

WHEREAS, on November 17, 2011, while the matter was pending before the Hearing Examiner, Delmarva, Staff, the DPA and the CRI reached an agreement entitled "Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2 ("Path Forward");" and

WHEREAS, after consideration of the letters from the public, the discussions of the workshops held to consider the IRP, the comments filed by the parties and Delmarva's Reply Comments, the Hearing Examiner held that there was ample evidence to find that the requirements for public investigation and comment had been satisfied under 26 *Del.C.* §3010.9.2; and

WHEREAS, the Hearing Examiner submitted her Findings and Recommendations on November 22, 2011 recommending that the Commission ratify the IRP pursuant to 26 *Del. C.* §3010.2.0 as reasonable and in the best interests of Delaware ratepayers; and

WHEREAS, the Hearing Examiner further recommended that the Commission approve the proposed Path Forward as just and reasonable and in the public interest; and

WHEREAS, DNREC, MAREC, NRG and RESA filed exceptions to the Hearing Examiner's Findings and Recommendations; and

WHEREAS, the Commission met in open session on December 20, 2011 to consider the participants' arguments and exceptions;

NOW, THEREFORE, BY THE UNANIMOUS VOTE OF THE COMMISSIONERS, IT IS HEREBY ORDERED:

1. That, except as expressly set forth in the following ordering paragraphs, the Commission adopts the Findings and Recommendations of the Hearing Examiner, appended to the original hereof as Attachment "1," specifically her finding that the "Proposed Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2" provides a mechanism for the parties and interested persons to improve upon the 2010 IRP, address specific concerns raised by the commentators to the current IRP and provide mandatory meetings to discuss and evaluate studies, scenarios and inputs for the next IRP to be filed on or before December 1, 2012.

2. That the Commission explicitly rejects that portion of the Hearing Examiner's Findings and Recommendations and Paragraph 4 of the "Proposed Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2" to the extent that they suggest that Delmarva Power & Light Company is not required to file a new IRP every two years. We read 26 *Del. C.* §1007(c)(1) to require Delmarva to file an IRP every two years after the date of the first IRP on December 1, 2006. The statute is silent as to whether that IRP can be an "update," as the Path Forward suggests. We are not suggesting that Delmarva may not use existing models and studies if they are still relevant and accurate, but merely stating that unless the General Assembly amends Section 1007(c)(1), a full IRP is required every two years.

3. That the Commission ratifies the Integrated Resource Plan, appended to the original hereof as Exhibit "A" to the Hearing

Examiner's Findings and Recommendations, as filed in compliance with the Electric Utility Retail Customer Supply Act of 2006 ("EURCSA"), 26 *Del. C.* §1006 *et seq.*

4. That the Commission approves all other portions of the "Proposed Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2," appended to the original hereof as Exhibit "B" to the Hearing Examiner's Findings and Recommendations.

5. That the Commission reserves the jurisdiction and authority to enter such further Orders in this matter as may be deemed necessary or proper.

BY ORDER OF THE COMMISSION:

____
Chair

/s/ Joann T. Conaway
Commissioner

/s/ Jaymes B. Lester
Commissioner

/s/ Dallas Winslow
Commissioner

/s/ Jeffrey J. Clark
Commissioner

ATTEST:

/s/ Alisa Carrow Bentley
Secretary

Attachment "1"

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IN THE MATTER OF INTEGRATED RESOURCE PLANNING FOR THE PROVISION OF STANDARD OFFER SERVICE BY DELMARVA POWER & LIGHT COMPANY UNDER 26 *DEL. C.* §1007(c) & (d)	)	**PSC DOCKET NO. 10-2**

FINDINGS of FACT, CONCLUSIONS OF LAW AND RECOMMENDATIONS
OF THE
HEARING EXAMINER

DATED: November 22, 2011

RUTH ANN PRICE
SENIOR HEARING EXAMINER

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BEFORE THE PUBLIC SERVICE COMMISSION
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FINDINGS of FACT, CONCLUSIONS OF LAW AND RECOMMENDATIONS
OF THE
HEARING EXAMINER

Ruth Ann Price, duly appointed Hearing Examiner in this Docket pursuant to *26 Del. C.* §502 and *29 Del. C.* ch. 101, by Commission Order No. 7808, dated July 22, 2010, Commission Order No. 7882 dated December 21, 2010, and Commission Order No. 7888 dated January 11, 2011, and reports to the Commission as follows:

I. APPEARANCES

On behalf of Delmarva Power & Light Company (“Delmarva” or “the Company”):

BY: TODD L. GOODMAN, ESQUIRE, Associate General Counsel

On behalf of the Public Service Commission Staff (“Staff”):

BY: REGINA A. IORII, ESQUIRE, Deputy Attorney General
JULIE M. DONOGHUE, ESQUIRE, Deputy Attorney General
Janis L. Dillard, Deputy Director

On behalf of the Division of the Public Advocate ("DPA"):

BY: KENT WALKER, ESQUIRE, Deputy Attorney General

Michael D. Sheehy, Public Advocate

On behalf of Delaware Department of Natural Resources and Environmental Control ("DNREC"):

BY: VALERIE SATTERFIELD, ESQUIRE, Deputy Attorney General

Thomas Noyes, Policy Director

On behalf of Delaware Energy Users Group ("DEUG"):

BY: CHRISTIAN & BARTON, L.L.P.

MICHAEL J. QUINAN, ESQUIRE

On behalf of NRG Energy, Inc. ("NRG"):

BY: MORRIS NICHOLS ARSHT & TUNNELL LLP

BRYAN TOWNSEND, ESQUIRE

Steven Arabia, Director, External Affairs

On Behalf of Mid-Atlantic Renewable Energy Coalition ("MAREC"):

BY: BRUCE H. BURCAT, ESQUIRE

On Behalf of Retail Energy Supply Association ("RESA"):

BY: THE GREENE FIRM, PLC

BRIAN R. GREENE, ESQUIRE

On Behalf of Calpine Corporation ("Calpine"):

BY: SARAH G. NOVOSEL, ESQUIRE, SVP and Managing Counsel

John Citrolo, Manager, Government and Regulatory Affairs

On Behalf of Caesar Rodney Institute ("CRI"):

BY: David T. Stevenson, Director, Center for Energy Competitiveness

On Behalf of Sierra Club:

BY: KENNETH T. KRISTL, ESQUIRE

Environmental and Natural Resources Law Clinic

Widener University School of Law

On Behalf Eastern Shore Natural Gas Company (“ESNG”):

BY: William B. Zipf, Jr., Vice President

II. BACKGROUND

A. Procedural History of the 2010 IRP

1. The Electric Utility Retail Customer Supply Act of 2006 (“EURSCA”) requires Delmarva Power & Light Company (“Delmarva” or the “Company”) to file an Integrated Resource Plan (“IRP”) with the Delaware Public Service Commission (the “Commission”), the State Energy Office, the Controller General and the Director of the Office of Management & Budget, in which Delmarva is required to “systematically evaluate all available supply options during a 10-year planning period in order to acquire sufficient, efficient and reliable resources over time to meet its customers’ needs at a minimal cost,” “set forth [Delmarva’s] supply and demand forecast for the next 10-year period” and “set forth the resource mix with which [Delmarva] proposes to meet its supply obligations for that 10-year period…” (26 *Del. C.* §1007(c) (1)).

2. On December 1, 2006, Delmarva filed its initial IRP pursuant to the EURSCA. Pursuant to Order No. 7122 dated January 23, 2007, the Commission opened Docket No. 07-20 to perform its oversight and review of the IRP.

3. By Order No. 7263, dated August 21, 2007, the Commission opened PSC Regulation Docket No. 60 to consider the development of rules and regulations to accomplish integrated resource planning for Delmarva's Standard Offer Service ("SOS") customers, as authorized by EURSCA. After circulating drafts of the proposed rules to the interested parties, the Commission, by Order No. 7628, dated August 18, 2009, promulgated revised proposed regulations (the "IRP Regulations") to govern Delmarva's development of its IRPs for its SOS customers. No comments were filed with the Commission regarding the revised Proposed Regulations. Accordingly, pursuant to Order No. 7693 (December 8, 2009), the Commission promulgated the revised *Integrated Resource Planning Regulations* and directed the Secretary of the Commission to transmit them to the *Delaware Register of Regulations* for publication as final regulations. The final IRP Regulations were published in the *Delaware Register of Regulations* on January 11, 2010 and became effective on or about January 21, 2010.

4. Following the adoption of the IRP Regulations, the parties to PSC Docket No. 07-20 agreed that PSC Docket No. 07-20 should be closed and that Delmarva would file by May 31, 2010 a new IRP consistent with the IRP Regulations. In addition, in developing its new IRP, Delmarva would seek input from the public and key stakeholders through a series of technical working group meetings.

5. In Order No. 7661 (September 22, 2009), the Commission approved the parties' agreement, established a schedule of working group meetings and an IRP filing date of May 31, 2010, and closed Docket No. 07-20.

6. The Company conducted the technical working group meetings required by Order No. 7661 on issues including externalities, demand side management, conservation, modeling scenarios and load forecasting, and has continued to schedule and conduct additional technical working group meetings as deemed necessary by the participants.

7. At a technical working group meeting on February 23, 2010, Delmarva addressed the changes in the regional energy environment since Order No. 7661 and the effect those changes were likely to have on the PJM Regional Transmission Expansion Plan ("RTEP") that the PJM Board was expected to release in late June 2010. Delmarva specifically noted that as a result of the changes in the regional energy environment that will result from these events - changes over which neither Delmarva, the Commission or the State of Delaware had any control and which obviously cannot be included in an IRP that was scheduled to be filed on May 31, 2010 - the 2010 RTEP was likely to render any previously-filed IRP moot. Delmarva contended that the 2010 RTEP results would be critical in developing a 10-year plan that included the most relevant and pertinent information for assessing key decisions regarding Delaware's energy future. The participants of the February 23rd technical workshop agreed that an extension of the filing date for the 2010 IRP was appropriate under the circumstances.

8. On March 11, 2010, Delmarva filed a Motion to Amend Filing Date (the "Motion") seeking the Commission's approval to amend Order No. 7661 to change the date for the filing of the 2010 IRP from May 31, 2010 to a date 90 days after the date that the PJM Board approves

the 2010 RTEP. In its Motion, Delmarva stated that an extension of 90 days after release of the 2010 RTEP (until approximately October 1, 2010) should provide it sufficient time to incorporate the results of the 2010 RTEP into the IRP models and meet all of the IRP Regulation requirements. Seeking to obtain the most relevant formulation of energy needs for the Company, the Commission granted the extension of the deadline for filing the IRP to October 31, 2010.

9. However, on September 1, 2010, Delmarva filed another motion to extend the filing deadline. As the summer progressed, Delmarva had not received any information concerning when the PJM Board would issue the 2010 RTEP. Understanding that not having the 2010 RTEP by September 1, Delmarva would not be likely to meet its October 31 deadline to file the 2010 IRP, the Commission granted; Delmarva's requested extension of the filing deadline until November 15, 2010. *See* PSC Order No. 7869 (Nov. 10, 2010).

10. On November 9, 2010, Delmarva filed a third motion to extend the filing of its IRP to December 1, 2010. Delmarva's motion was occasioned by a request from the Department of Natural Resources (DNREC) for it to have additional studies performed; a request that the Company did not receive until late in the summer. Pursuant to PSC Order No. 7869 (Nov. 10, 2011), Delmarva's request was granted, and it filed its 2010 IRP on December 1, 2010.

11. At its meeting on January 11, 2011, the Commission entered PSC Order No. 7888 which, among other things, acknowledged that under 26 Del. Admin. Code §3010, Paragraph 2.0 the IRP was administratively complete. Further, noting that under 26 Del. Admin. Code §3010,

Paragraph 9.2, interested State Agencies, interested persons and members of the public were to be afforded an opportunity to review and comment on the IRP, the Commission ordered notice of the filing to be published in *The News Journal* and *The Delaware State News* newspapers on February 1, 2011 and February 2, 2011, respectively. Interested persons were permitted to file written comments regarding the IRP by March 31, 2011. Responding comments by Delmarva were due on or before April 29, 2011. In addition, the Commission ordered that persons or entities may file petitions to intervene by February 23, 2011.

12. **Intervenors.** Petitions for intervention were received and granted for nine (9) entities. They are: DNREC, DEUG, NRG, MAREC, RESA, Calpine, CRI, Sierra Club, and ESNG. Nevertheless, on May 31, 2011 comments were received from the Delaware Nurses Association and John E. Greer, Jr., P.E. Neither party formally intervened.

13. On March 10, 2011, Staff filed a motion to amend the deadlines for filing comments on the IRP and for filing Delmarva's reply comments. Asserting the fact that it had received a number of comments from the public, Staff sought to hold at least one, possibly more, workshops to allow members of the public to learn more about Delmarva's forecasts and conclusions contained in the IRP. Staff's motion to Modify Schedule at ¶3. At its March 22 meeting, the Commission approved Staff's request to extend the deadline for filing comments on the IRP from March 31 to May 31, 2011 and for Delmarva's submission of reply comments from April 29 to June 30, 2011. PSC Order No. 7936 (March 22, 2011). Thereafter, the date for filing Delmarva's Reply Comments was continued until July 29, 2011.

14. **Workshops**. Prior to its filing on December 1, 2010, Delmarva, Staff and the DPA held a total of eight workshops concerning the development of the IRP.[1] After the filing, one workshop was held on March 14, 2011 which was attended by representatives of Delmarva, Staff, DPA, Caesar Rodney Institute, Partnership for Sustainability, Climate Common Sense, Widener Law Environmental & Natural Resources Group, Calpine, DNREC, the Delaware Chapter of the Sierra Club and two individuals, John E. Greer, Jr., P. E. and John Nichols. In addition, representatives of DEUG, ICF, Synapse and Scientific Certification System participated by telephone.

15. **Public Comments.** Throughout the course of IRP'S development and completion, the Commission has received developing, completing the 2010 IRP, including the workshops and the comment period, the Commission has received approximately fifty letters from the public expressing a range of viewpoints. Some commentators urge Delmarva to increase its use of renewable fuel sources above that mandated by the current law. Other commentators dispute the need for renewables in the mixture of fuel sources for Delmarva's Standard Offer Service ("SOS") customers. These commentators contend that the use of renewables will not appreciably clean and revitalize the environment or that there is no credible scientific proof that global warming exists or, even if it does exist, the use of alternative fuels will mitigate the impact of this phenomenon.

[1]Delmarva, Staff, the DPA and, on occasion, others held workshops concerning the 2010 IRP on September 15, 2009, October 22 and 26, 2009, November 5, 2009, December 4 and 7, 2009, February 23, 2010 and March 31, 2010.

B. **Comments Of The Parties**

16. Pursuant to PSC Order No. 7936, comments were received from Commission Staff, GDS Associates on behalf of DPA, DEUG, DNREC, The Sierra Club, RESA, CRI, Calpine, NRG, MAREC, Delaware Nurses Association and John E. Greer, Jr., P.E.

1. **Commission Staff (Appendix Tab 1)**[2]

17. The Commission Staff retained Synapse Energy Economics ("Synapse") to prepare its review of Delmarva's 2010 IRP. Synapse developed a detailed evaluation of Delmarva's 2006 and 2008 IRP filings. Synapse's evaluation of these IRPs were filed with the Commission in a report dated April 2, 2009. Synapse's comments filed in this docket are a follow-up to its April 2009 report and its evaluation of the 2010 IRP.

18. Synapse's comments focused on four (4) key areas: (1) compliance with the IRP regulations; (2) the role of demand-side initiatives in meeting the needs of SOS customers; (3) Delmarva's choice of resource portfolio for SOS customers; and (4) possibilities for employing gas-fired generation and on-shore wind generation to supply requirements for SOS customers.

19. **2010 IRP Compliance with Energy Efficiency Statute[3] and Regulations**. Synapse found that Delmarva's 2010 IRP substantially met the requirements of the statute. However, Synapse identified five

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[2] For the convenience of the reader, a complete copy of the comments submitted by the Intervenors is included as an Appendix to this report. The "Tab __" reference provides the number of the tab where the text of the referenced comments can be found in the Appendix.

[3] The Energy Conservation and Efficiency Act of 2009, as amended*, 26 Del. C.* §§1507.

areas that should be addressed in its ***next*** IRP. First, Synapse found that Delmarva's portfolio heavily relied on FSA (Full Requirements Service Agreements) renewable purchases, which Synapse observes may be contrary to Resource Portfolio Option 5.1 that requires Delmarva not to rely exclusively on any particular resource or purchase procurement policy. Secondly, Synapse cited Delmarva's compliance with Resource Portfolio Option 5.2 as a concern because the IRP did not contain an analysis of purchases of energy efficiency resources other than savings from non-EE utility programs and there was no investigation of alternatives to FSA supply contracts.

20. Third, Synapse found that Delmarva had not fully satisfied the requirements of Resource Portfolio Option 5.6 by failing to provide "a detailed description of its energy efficiency activities ...." Fourth, the IRP does not contain a description of the Company's energy efficiency initiatives, but references exclusively the SEU's[4] programs. Fifth, Staff's consultant further finds flaws in Delmarva's compliance with Plan Development 6.1.3 because Delmarva did not include an analysis of cost-effectiveness of direct procurement of additional energy resources; again relying on the SEU's programs.

21. **Demand Side Initiatives**. Synapse notes that under the Energy Conservation and Efficiency Act of 2009[4] ("Act") Delmarva must meet Energy Efficiency Resource Standards ("EERS") targets of 2% of both the 2007 electricity consumption and the 2007 coincident peak electrical demand by 2011; and by 2015, 15% of consumption and coincident peak

[4] The Sustainable Energy Utility (SEU) was created by the Delaware Legislature in 2007 to develop, implement and advance energy efficiency and conservation efforts in Delaware.

demand. In order to reach these levels, Delmarva asserts that it is responsible for implementing demand response and "utility provided energy efficiency programs,"[7] such as combined heat and power, and street lighting and transmission improvements. Further, these goals will be achieved in coordination with the SEU and other energy efficiency programs.

22. Using a linear savings ramp for the period 2011 through 2015, Delmarva computed its EERS targets. *See* IRP, Tables B.1 and B.2, p 10-11. Synapse shows the near-term energy reduction and demand savings goals below in Table 2. Since the Act does provide targets from 2016 through 2020, Delmarva has used a linear calculation for savings through the 2020 planning period. Therefore, "Delmarva has chosen to hold the goal constant at 15% of 2007 consumption and demand for each subsequent year in the planning period (through 2020)." Synapse Report at 3.

Table 2: Delmarva DE Energy and Coincident Peak Demand Reduction Goals

Year	Percentage	Peak Demand Reduction (MW)	Consumption Reduction (MWh)
2011	2%	37	174,542
2012	5%	84	465,030
2013	7%	132	751,281
2014	11%	198	1,037,045
2015	15%	275	1,309,067

Synapse Source: 2010 IRP, pages 54-55.

23. Synapse notes that Delmarva has used both its energy efficiency programs and SEU programs to meet its energy (MWh) and demand (MW) savings. To demonstrate Delmarva's reliance on SEU programs to meet its goals, Synapse provides a table demonstrating that Delmarva anticipates deriving roughly two-thirds of the 2015 EERS target for energy savings (MWH) from SEU programs. Synapse Report

Table 3, p. 4. The remainder of the energy savings goal will come from combined heat and power ("CHP") and improved codes and standards. Delmarva describes a CHP evaluation conducted on its behalf by 1CF. That study illustrated that the target level for CHP could be obtained (roughly) under a 20% capital cost incentive program. Delmarva makes no specific recommendation for how to achieve these savings. Codes and standards savings are further described to include increases in air conditioning equipment efficiencies. Utility-specific programs and weatherization programs comprise a total of just 5.9% of the 2015 EERS target for energy savings. Synapse notes that Delmarva is relying on “Advanced Metering Infrastructure ("AMI") and direct load control for 39% of the 2015 demand savings, SEU programs for 44% of 2015 demand savings, and the remaining ~16% coming from codes and standards, CHP, weatherization, and utility transmission, distribution and street lighting programs.” Synapse Report at 3.

24. Synapse notes that Because the SEU by statue is exclusively responsible for the developing and initiating energy efficiency programs in Delaware, Delmarva is not developing its own programs. Synapse Report at 4. However, the SEU and Delmarva meet quarterly to discuss the status of energy savings. *Id.*

25. Staff’s Consultant recommended closer coordination between Delmarva and the SEU in energy efficiency and conservation efforts. Further, Synapse contendeds that closer coordination between Delmarva and the SEU will be required if an energy efficiency surcharge is implemented pursuant to the Energy Efficiency and Conservation Act. Synapse estimated

that this form of surcharge would be capped at roughly 0.9 mills/kWh ($0.9/MWh). Synapse Report at 7.

26. Further, Synapse recommended that Delmarva find the best methods to maximize peak demand savings available from AMI customers. Delmarva should continually refine its AMI tariff after it becomes effective to ensure such savings. *Id.*

27. **Standard Offer Service Procurement Portfolio**. Staff's Consultant recommended that Delmarva consider moving toward direct physical purchase of energy through the PJM spot market for SOS load. Synapse Report at p. 8. Further, in coordination with direct purchases, the Consultant recommend that Delmarva consider analysis of the effect of different types of hedging strategies designed to minimize price volatility. Of interest, Synapse noted:

> The current FSA approach is one hedging strategy, essentially at one end of the continuum of options for addressing price and volume risk for SOS load. Another strategy would be for Delmarva itself to secure minimal forward pricing hedges (using the 12-18 month forward available in PJM, as noted by Brattle) based on the underlying load profiles of the SOS sectors. A third strategy would be to use solely a spot-price pass through for SOS load, but fix the price on a quarterly, seasonal, 6-month, or annual basis and true up imbalances in some periodic fashion. To meet the minimum requirements of Section 5.4 of the IRP regulations, Delmarva could fix the volume of SOS load (either physical load, or financial hedging products) procured in annual auctions at 30% of its expected energy requirement. For any of these alternatives, different combinations of longer-term hedging or physical energy products (such as

> long-term contracted wind plant output) can complement the shorter term purchases.

Synapse Report at p.8.

28. While Synapse was careful to assert that it was not recommending a particular approach, it did conclude that for the SOS portfolio it recommended that Delmarva should carefully analyze these options with the goal of minimizing costs for SOS load. The Consultant observed that currently:

> SOS costs include a premium associated with fixing the price for three years and there is no direct analytical evidence provided by Delmarva in its IRP submittal that this approach is most likely to result in minimal costs for SOS customers. Depending on tariff design particulars under a "spot price pass-through" approach, and also depending on mechanisms in place for customers to better control temporal usage patterns or overall use, other options might provide lower overall costs to SOS load while still maintaining some degree of price stability.

Synapse Report at 10, footnotes omitted.

29. Further Synapse recommended that “Delmarva conduct an analysis of the effect on SOS rates of switching to procuring SOS energy in the PJM day-ahead energy market, SOS capacity in the PJM RPM market, and SOS ancillary service obligations in the respective PJM ancillary service markets. The analysis should be based on two historic periods—one period of rising energy prices and one period of declining energy prices. This additional information will assist in determining whether there is sufficient benefit in deviating from the current three-year rolling average SOS procurement process.” *Id.*

30. In addition, Staff's Consultant opined that there were other measures, such as: "(i) the availability of interval metering for SOS customers,(ii) the potential for covering a part of capacity obligations through direct investment in a gas-fired combined cycle unit (discussed in the following section), and (iii) the ability to reduce peak load (and associated peak period prices) through increased use of direct load control and AMI-enabled demand reduction" that could lower overall SOS costs. *Id.*

31. **Combined Cycle Unit ("CC Unit") and Wind Alternatives.** Staff's Consultant recommended that new alternatives for new CC unit procurement should be investigated, including accounting for capacity price risk with the potential benefit associated with new gas unit contributions toward reducing health risks. Further, Delmarva should conduct a review of current costs of on-shore wind alternatives, and compare them to those used in the IPM model. Delmarva should coordinate its initiatives regarding AMI, dynamic pricing, customer choice, revenue decoupling, IRP, and compliance with state energy efficiency and renewable policies with the SOS procurement process to ensure maximum synergy. Synapse Report at 12.

2. DPA (Appendix Tab 2).

32. DPA submitted the report of its consultant, GDS Associates, Inc. ("GDS"). GDS submitted recommendations regarding load forecast, transmission planning, demand side analysis, supply side analysis and renewable resources planning.

33. Regarding load forecasting, GDS recommended that Delmarva develop more comprehensive reporting of the load forecast, expressly

identifying all assumptions, important model inputs, forecasting model specification and outputs, and forecast outputs. The data used to develop forecasting models should be provided in table form in the report or as an appendix. GDS Report at 3. For projections regarding residential energy supply, GDS recommended that Delmarva move from an econometric model to an end-use model or a hybrid end-use/econometric model. GDS asserted that these models would provide for greater quantification and understanding of the many factors impacting residential consumption. *Id.*

34. With regard to transmission planning, GDS contended that "the IRP should include a more robust treatment of transmission options, including the cost of transmission capacity needed to meet capacity requirements." *Id.* Further, GDS asserted that Delmarva should more clearly identify the interconnection costs for new capacity. Of importance, GDS contended that Delmarva should present a more detailed contingency plan for loss of major transmission facilities. *Id.*

35. For its demand side analysis, GDS suggested that Delmarva provide more detailed documentation, especially for non-SEU programs. More detailed documentation should be provided, such as key assumptions regarding measure-level energy and demand savings estimates, market adoption rates, incentive levels, and full documentation of benefit and cost assumptions. *Id.*

36. DPA's Consultant contended that since a high proportion of the estimated saving rests on prospective programs that may not operate as intended, the IRP should contain a scenario analysis of the consequences if all of the expected goals are not met. Further, GDS recommended that

Delmarva should model the "program interactions" when estimating peak demand and energy savings. *Id.*

37. In its supply side analysis, GDS maintained that Delmarva should subject all potential resources to sensitivity analyses based on changes in critical assumptions, such as fuel price projections. It was recommended that Delmarva provide all of the assumptions used in the modeling of Full Service Requirements Agreements. Further, "long term energy supply agreements should be evaluated as part of the IRP development." GDS Report at 4.

38. Regarding renewable resources planning, GDS Associates asserted that Delmarva should "present a complete schedule of sources and uses of RECs and SRECs, with the impact of any multiplier effects for the planned sources and uses as well as contingency sources and uses of RECs and SRECs." Further, the Company should expand its contingency plans in the event the offshore wind farm not come on line as scheduled. GDS also recommended that Delmarva show all assumptions and calculations that demonstrate how their assumed renewable supplies translate to ratepayers on an aggregate and incremental basis. Delmarva should also develop contingency plans to address probabilities of variance in load and/or DSM impacts. These plans should explicitly show the probability of those variances and the effect the variances would have on acquiring RECs and SRECs. *Id.*

3. **DNREC (Appendix Tab 3)**.

39. DNREC opined that the *IRP analysis is too limited by the choice of alternative scenarios.* DNREC noted that the study examined

only three alternative means "of procuring approximately 80 percent of the total projected load increment (the increased Standard Offer Service ("SOS") capacity required to meet load projections is ~186 MW between 2011 and 2020). These included an additional 150 MW of onshore wind, an additional 150 MW of offshore wind, and an additional 135 MW of additional combined cycle gas power." DNREC Comments at 2.

40. DNREC stated:

> While these examples may explore a range of alternatives that exist wholly within DP&L's control to implement, they fall short of being able to fully explore all the "dimensions" the IRP lists for comparing the Reference Case with the three selected Scenarios—price, price stability, and environmental benefits. As we explain in these comments, there is little practical information to be taken from the CMAQ results that can inform to any significant extent a comparison of environmental benefits among the Scenarios, or even relative to the Reference Case. This seriously undermines the useful scope of the IRP. Delaware State legislation requires that, "In its IRP, DP&L shall explore in detail all reasonable short-term and long-term procurement or demand-side management strategies, even if a particular strategy is ultimately not recommended by the company."[1] It further states that, "The IRP must investigate all potential opportunities for a more diverse supply at the lowest reasonable cost." There is not enough developed information to evaluate a true set of reasonable strategies, particularly longterm implications.

DNRC Comments at 2-3.

41. DNREC believes that Delmarva has focused too narrowly on the Act's directive for the "lowest reasonable cost" for energy supply. DNREC interprets the legislation to provide that the IRP may consider "the environmental and economic value" of a range of considerations including environmental and public health benefits. DNRC Comments at 4.

42. DNREC summarized its recommendations as follows:

> [In] future IRP analyses include the environmental and public health benefits in calculating the minimum cost to consumers. The current analysis approach—limited to analysis of only a very few, small initiatives—fails to recognize the potential least-cost tradeoffs that might be selected had environmental and public health benefits of these options been properly accounted for allowing a wider range of alternatives to fit within the "minimum cost" threshold used for scenario selection. We ask that future IRP analyses consider the following recommendations:
>
> 1. Monetized and annualized environmental and public health benefits that accrue to residents of Delaware as well as to surrounding populations in the Northeast U.S. should be evaluated and considered side-by-side with annualized capital investment, O&M, and fuel costs for various resource supply options.
> 2. The combination of electricity price impacts along with offsetting environmental and public health benefits should be used at the determinant for which scenarios meet the requirements of providing resource supply alternatives at "minimum cost."
> 3. A wide variety of alternative scenarios should be explored including (a) bounding scenarios that look at the significant uncertainty related to the stringency and pace of federal environmental program implementation, (b) enhanced regional or federal programs targeted at emissions reductions, energy efficiency, and renewable power deployment, as well as (c) the prospect of enhanced in-state deployment of renewable power generation and demand-side management programs significantly in excess of current state requirements.
> 4. Continue to utilize the robust set of analytical tools employed for this IRP in a manner that broad-based environmental and human health impacts can be assessed over a wide geographical domain with a high degree of spatial resolution (utilizing pollutant tagging where appropriate and justified). Outcomes should be monetized to the extent feasible and discussed qualitatively where not.
>
> ***Conclusion.*** In summary, DNREC finds the current analysis to be an excellent basis for understanding how the current state RPS and demand-side management programs are likely to be implemented and the

> associated air quality and public health benefits associated with these laws. We do not, however, feel that this adequately fulfills the charge to DP&L that “all available supply options” be analyzed taking cost into consideration. The potential environmental and public health cost savings associated with large-scale deployment of renewable energy and energy efficiency (beyond the existing requirements due to potential climate regulation and legislation or lack thereof) would provide a basis for understanding how the selected path compares in terms of cost, environmental impacts and public health.

DNREC Comments at pp 9-11.

4. <u>RESA (Appendix Tab 4)</u>

43. Retail Energy Supply Association (“RESA”) filed comments concentrating on Delmarva’s recommendation in the current IRP to continue with its procurement of three-year wholesale contracts for electricity in order to provide SOS service to its residential and small commercial customers and one-year contracts to provide SOS service to its large commercial customers. RESA requests that the Commission open a separate docket to address the current SOS structure which, it asserts, does not promote competition among retail electric suppliers. RESA would also like the Commission to consider enhancements to the SOS structure that would be beneficial to residential and non-residential customers alike.

44. According to RESA, of Delmarva’s residential customers, only 2.9% were obtaining power from retail suppliers. This is believed to be caused by the current rate structure, which does not allow retail suppliers consistent opportunities to compete with SOS pricing. With numerous competitive suppliers available, customers would benefit

in several ways including lower pricing, price stability and alternative market solutions (e.g. renewable energy and other value-added products and services).

45. One of the value-added enhancements RESA is requesting the Commission consider is purchase of receivables ("POR") programs. These programs require the SOS provider to purchase the retail supplier's receivables and require the electric distribution companies to provide basic customer information to retail suppliers. The POR program would allow retail electric suppliers to market directly and communicate to mass-market customers.

46. RESA also supports its position that shorter one-year SOS contracts benefit customers by stating that in other jurisdictions, such as Maryland and Pennsylvania, where the three-year SOS contracts were eliminated, there was an increase in the number of residential customers who actively shopped and purchased power from retail suppliers. The longer contract terms keep customers from enjoying favorable rates when they are available.

5. Calpine (Appendix Tab 5)

47. Calpine develops, finances, owns and operates independent power production facilities and wholesale markets electricity in the United States and Canada. Calpine operates in twenty states and Canada, but it owns 19 plants and approximately 4,500 MW of gas-fired generation in five Mid-Atlantic States in the PJM Region. Calpine Comments 2-3.

48. Calpine asserts that the IRP does not address measures to lessen the impact of environmental regulations that will "exert upward pressure on regional power prices" and reduce dependency on electricity imports. Calpine advocates that a procurement process that includes new and existing generation resources is the answer to this problem. *Id.* at 1.

49. Calpine complains that the IRP "understates the importance of developing flexible gas-fired generation to operationally balance the additional development of the potential growth of intermittent renewable generating resources." Calpine Comments at 2.

50. Further, Calpine contends that the IRP does not satisfy Rule 6.1.4 of the Commission's IRP regulations because it does not include an analysis of the environmental ramifications associated with power supplied from out-of-state resources. *Id.* Calpine also asserts that the IRP fails to comply with Rule 6.1.5 of the Commission's IRP rules by "understating the impact on Delaware's environmental footprint from demand-side resources that rely on on-site generators to maintain electric consumption levels during a demand-side response call." *Id.*

6. NRG ENERGY (Appendix Tab 6)

51. The comments submitted by NRG Energy focused on the procurement portion of supplying SOS customers. NRG would like the Commission to consider one-year laddered contracts for residential and commercial customers. It would also like the Commission to eliminate the one-year fixed price option for large commercial customers, making the hourly priced default service the only option. NRG stated that the shorter contract terms would improve the retail electric market in

Delaware by increasing competition, lowering risk premiums and possibly establish lower rates for customers. NRG also recommend the use of POR and supplier consolidated billing. Both of these methods would attract new suppliers to Delaware, thus making retail energy a truly competitive market.

7. MAREC (Appendix Tab 7)

52. The Mid-Atlantic Renewable Energy Coalition ("MAREC") submitted comments generally in favor of Delmarva's IRP recommendations. However, MAREC did express concerns over Delmarva's RFP process for procurement of renewable energy sources. MAREC proposes that Delmarva include an RFP provision in its IRP that would solicit at least 100 MW of new wind energy capacity through long-term contracts for energy and RECS. These contracts would aid in resource price stabilization and help Delmarva meet its increasing RPS requirements.

8. SIERRA CLUB (Appendix Tab 8)

53. The comments of the Sierra Club centered on its desire to have the Commission give more weighted consideration/analysis to the environmental benefits and externalities of Delmarva's IRP. They set forth three items they felt the Commission should consider implementing as part of the IRP:

a. Require Delmarva to report significant (>5% deviations) deviations from the generation mix specified in the IRP reference case;

b. Require Delmarva to perform externality analyses for significant deviations from the generation mix specified in the IRP reference case; and

c. Require Delmarva to seek PSC approval for a significant increase in coal as part of the fuel resource mix.

54. The Sierra Club contends that externality analyses of energy sources will aid in determining the true cost of these energy sources and the effect they have on public health and environmental issues.

9. <u>CRI (Appendix Tab 9)</u>

55. CRI contends that the 2010 IRP fails to meet the legislative requirements that power afforded to SOS customers is "reliable … and at the lowest possible price." The IRP itself is not to blame for these failures, but as CRI views the situation "[t]here has been inadequate advocacy to resist laws and regulations that fail to meet the primary responsibilities of reliability and low cost." CRI Comments at 1. CRI asserts that in moving from fossil fuels to renewable energy, reliability and cost have been sacrificed. CRI notes that natural gas reserves have tripled and its cost has been substantially reduced. Therefore, natural gas provides a faster path to the reduction of greenhouse gas emissions and air pollutants. CRI Comments, Summary at p.1. CRI contends that in order to re-establish the mandates of reliability and low cost, legislative changes are necessary in order to accomplish these goals. Consequently, CRI has included the following list of laws and regulations that it contends cause the IRP to be inadequate:

- A requirement for long term, laddered supply contracts when flexibility in contract negotiation is needed.
- An Energy Efficiency requirement that relies on questionable government run programs and ignores the success of free markets in constantly improving the Energy Intensity of our state.
- A Regional Greenhouse Gas Initiative that has failed to reduce greenhouse gas, raised electric rates, and adds to the difficulty of building generating plants in Delaware.
- An electric generation restructuring process combined with inadequate local generation capacity that has left us subject to grid congestion and the associated costs of Capacity Charges and Locational Marginal Pricing that has left Delaware uncompetitive with most other states
- A requirement to carry out an Externalities study of IRP scenario options that adds $350,000 a year to electric rates and offers no useful information to distinguish one option from another. Plus flawed assumptions have been used in calculating the externalities. *Id*.

55. Further, CRI argues that the IRP is premised on a "Renewable Portfolio Standard (RPS) that requires the use of unreliable, expensive alternative energy sources while ignoring clean, reliable, affordable energy sources such as natural gas, nuclear, and hydroelectric." CRI does not view Delmarva's 2010 IRP as meeting the basic goals of providing SOS customers reliable and low cost energy.

10. <u>JOHN E. GREER, JR. P.E. (Appendix Tab 10)</u>

56. Mr. Greer's comments stated that the purported benefits of alternative energy generation in Delaware would have little to no effect on air quality and health issues; therefore, the exorbitant cost of these projects is not warranted.

11. DELAWARE NURSES ASSOCIATION (Appendix Tab 11)

57. Nurses Healing Our Planet is an ad hoc committee of the Delaware Nurses Association that submitted comments in favor of Delmarva's IRP and its efforts to move to a greater presence of clean renewable energy sources in its portfolio.

12. Delmarva Reply Comments (Appendix Tab 12)

58. On July 29, 2011, Delmarva filed its Reply Comments to the comments filed by the parties. Delmarva's Reply Comments did not undertake to refute item by item the assertions of the parties. Rather, it addressed the more important concerns of the commentators and it put forward its plan for the next steps for the IRP process. Delmarva summarized its basic comments as:

- The IRP working group process has been successful in constructively engaging key stakeholders in a collaborative process.
- The IRP as filed is compliant with EURCSA and the IRP rules and regulations.
- The IRP, as submitted, does not request Commission approval for any tariff, program implementation or other specific action not otherwise already approved by the Commission. Consequently, the 1RP as filed requires Commission ratification, rather than Commission approval.
- To the extent that Delmarva seeks to change the resources or process for securing new resources for SOS procurement before the next IRP is prepared, the Company will seek Commission approval for such changes through separate application.
- Staff, DPA, and DNREC all recommend that theirsuggested changes to the IRP be considered as part of the *next* IRP.
- Delmarva recommends that the IRP working group continue to meet no less than once per quarter. A number of potential topics for collaborative discussion

have already been provided by the parties in their comments submitted in this Docket. Delmarva suggests that each topic presented by the parties in the respective comments be addressed in the working group meetings.

- The Hearing Examiner should recommend that Delmarva's IRP as filed December 1, 2010 be ratified by the Commission.

Delmarva Reply Comments at p. 1. As seen *infra*, many of these recommendations and insights laid out by Delmarva here form the foundation for the agreement entered into by some of the parties.

III. SIGNATORY PARTIES PATH FORWARD AGREEMENT

59. On November 17, 2011 at 6:25 p.m., I received by electronic mail a message from Todd Goodman, Esquire, counsel for Delmarva, informing me that Commission Staff, DPA, CRI and Delmarva had reached an agreement on a recommended "path forward" in this case. This document is entitled "Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2 ("Path Forward"). See Exhibit "B" attached hereto. Mr. Goodman mentioned that DNREC would not join the recommended path forward. Signatures had not been obtained yet from Intervenors NRG, Calpine, MAREC, RESA, DEUG, Sierra Club and ESNG, but the signatory parties were in the process of trying to collect them.

60. The Path Forward requests that this Hearing Examiner recommend to the Commission that it ratify Delmarva's 2010 IRP. In addition, the Path Forward sets forth certain proposals that would be binding on Delmarva's future IRP filed under 26 *Del.C.* §1007. These proposals provide that Delmarva would continue "to manage its supply portfolio as it does in the manner currently approved by the

Commission." If changes were needed in the future to resources or processes to obtain resources, Delmarva would apply to the Commission for approval. Path Forward, Proposal No. 1. Going forward there will be an IRP Working Group every quarter to ensure stakeholder participation. Path Forward, Proposal No. 2. The signatory parties recognize that comments filed by the parties in PSC Docket No. 10-2 discuss recommended changes for the next IRP, which should be filed on or before December 1, 2012. A process for evaluating changes to load forecasting, analyses of DSM, IRP scenario selection, an alternative air quality model, transmission options and interconnection issues and the impact on customer bills from increased use of renewable resources will be developed in conjunction with the IRP Working Group.

61. Instead of creating an entirely new IRP every two years, Delmarva will alternate "new filings" and "updated filings." Further, the Path Forward provides that the IRP Working Group will evaluate the following issues in the following order priority:

> 1. Define "new" vs. "updated" versions of the IRP.
>
> 2. Discuss steps to be taken to continue the evaluation and potential implementations of natural gas fired generation on the Delmarva Peninsula, including but not limited to: evaluation criteria, RFQs, RFPs, accounting issues on future PPAs, and the benefits of regulated versus merchant generation.
>
> 3. Assessment of alternatives to DPL's current procurement process for SOS customer supply requirements.

62. The Path Forward signatories recognize and agree that the mechanism for enhancing electric choice is through the IRP Working Group or future IRP proceedings before the Commission.

IV. DISCUSSION AND RECOMMENDATION

63. The signatories to the Path Forward agreement request that I recommend ratification of the agreement to the Commission. Commission Ratification, under 26 *Del.C.* §3010.2.0, "means that after the completion of the regulatory process, including analysis by Staff and input from the public and other parties, the Commission finds that the IRP is not unreasonable and appears to be in the best interest of the ratepayers."

64. In this case, Interested State Agencies, interested parties and the general public have been afforded ample opportunity for review and comment of the 2010 IRP. Prior to filing the IRP, there were workshops to discuss its content and various on-going issues regarding its formulation. As stated earlier, a duly-noticed public workshop was held on April 11, 2011 to discuss the IRP. The participants at the workshop were permitted to ask Delmarva questions regarding the assumptions and inputs for the IRP. Participants were allowed to follow-up with questions in the fashion of informal interrogatories on specific areas of questions. Throughout the process of formulating and developing the 2010 IRP, the public submitted letters voicing areas of interest and concern about the process and the issues. Consequently, it appears that 26 *Del.C.* §3010.9.2 has been fulfilled allowing for a broad spectrum of comments to be discussed on the specifics of the IRP.

65. While some parties do not agree that Delmarva's 2010 IRP is adequate under the applicable regulations for a number of reasons, such as there were not more scenarios run concerning the public health impacts of the chosen power resources or the IRP does not contain sufficient study concerning alternative generation sources or there is not more fuel diversity, these omissions do not mean that the IRP is fatally flawed and should not be ratified by the Commission. Further, the Path Forward agreement addresses some of the deficiencies cited by the commentators as it lists subjects to be specifically considered in future quarterly IRP Working Group meetings. This is significant because each of the signatories have identified various items from the 2010 IRP they contend could have been investigated more thoroughly. Therefore, the path set forth in the agreement provides a mechanism for addressing these issues.

66. Further, 26 *Del.C*. §512 provides that the "Commission shall *encourage* the resolution of matters brought before it through the use of stipulations and settlements." [Emphasis added.] As long as the Commission finds a settlement to be in the public interest, the statute expressly provides that the Commission may approve a settlement even though not all of the parties agree with it. There are numerous reasons that one or more of the intervenors may not agree to the settlement. However, based upon the terms and conditions contained in the four corners of the Path Forward, I cannot find any impediments that would warrant the Commission not to approve it.

67. In addition, based upon my review of the regulations for developing the IRP for SOS customers, I find that Delmarva has

complied with 26 *Del. C.* §3010 and that the 2010 IRP should be ratified as it is just and reasonable and in the public interest. While the parties may disagree with elements of its formulation, these purported omissions are not sufficiently important to defeat ratification of the document.

68. Therefore, I find and recommend that:

A. The Commission ratify as just and reasonable and in the public interest the 2010 IRP of Delmarva Power & Light Company, which is attached as Exhibit "A" hereto.

B. The Commission approves as just and reasonable and in the public interest the "Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No.10-2", which is attached as Exhibit "B."

69. A proposed form of Order, which will implement the forgoing Findings and Recommendations, is attached hereto as Exhibit "C."

Respectfully Submitted,

Ruth Ann Price

Ruth Ann Price
Senior Hearing Examiner

Dated: November 18, 2011

EXHIBIT

A

Delmarva Power & Light Company
2010 Integrated Resource Plan

Filed: December 1, 2010

Delmarva Power & Light Company
2010 Integrated Resource Plan
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1. Executive Summary

I. <u>Introduction</u>

Findings

As measured by reliability, reasonable cost and price stability, Delmarva Power & Light Company (Delmarva, DPL) believes that the SOS procurement strategy it has pursued since the last IRP has been successful. That strategy has been to procure a series of laddered three year contracts for Full Service Requirements Agreements (FSA) energy for Residential and Small Commercial SOS customers and one year FSAs for Large Commercial SOS customers. Until 2009 the FSAs were bundled together with a portfolio of renewable energy resources which increases in size over time consistent with the requirements of the Delaware Renewable Portfolio Standards (RPS). In 2009 the Delaware Public Service Commission (the Commission) modified the FSA by removing the obligation of bidding energy providers to provide renewable energy credits (RECs), necessary to comply with Delaware's RPS. As such, Delmarva is now responsible for the acquisition of RECs and is doing so through a diverse portfolio described at length in this IRP.

In this IRP, Delmarva has concluded that continuing this strategy, with accommodations for the changes in laws and regulations governing its SOS procurement practices since November 2008, is a reasonable path forward.[1] As will be discussed in detail in the IRP analysis, this strategy also provides a number of environmental benefits. Emissions of CO2, SO2, NOX, and Hg are expected to decline significantly in Delaware over the ten year IRP planning period

In our plan the estimated human health benefits are very significant. These results are affected by the expected reductions in power plant emissions that can be attributed to a number of state and federal policies, Delmarva Power planning and other industry activity. These factors, as well as

---

[1] These changes include the impact of recently enacted legislation such as the Energy Efficiency Act of 2009 which established reduction targets of 15% for energy consumption and demand and the July 2010 amendments to the Delaware Renewable Portfolio Standards (RPS) which increased the percentage of Renewable Energy Credits (RECs) that Delmarva needs to procure for SOS customers. The 2010 IRP also takes into account the Department of Natural Resources and Environmental Control (DNREC) agreements with electrical generators in Delaware to retire older plants and install more effective emissions control equipment.

others contribute to greatly improving air quality and human health over the 10 year planning horizon.

Background

This Integrated Resource Plan (IRP) describes Delmarva's plan to procure the electrical energy requirements for its Standard Offer Service (SOS) customers for the 10 year planning period 2011 – 2020. This IRP is filed pursuant to Title 26, Section 1007 (c) (1) of the Delaware Code, which provides, in part:

> [Delmarva] is required to conduct integrated resource planning…. In its IRP, [Delmarva] shall systematically evaluate all available supply options during a 10-year planning period in order to acquire sufficient, efficient and reliable resources over time to meet its customers' needs at a minimal cost. The IRP shall set forth [Delmarva's] supply and demand forecast for the next 10-year period, and shall set forth the resource mix with which [Delmarva] proposes to meet its supply obligations for that 10-year period….

The legislation makes clear that while the IRP must investigate all potential opportunities for a diverse and reliable supply, including those that would create environmental benefits for Delaware, it must do so with a careful eye on costs. The legislation specifically provides that in developing the IRP, Delmarva must seek to meet its customer's energy supply needs "at the lowest reasonable cost"[2] and "at a minimal cost".[3] As such, the principal objectives of Delmarva's plan are to secure SOS customers a reliable energy supply at a reasonable cost, maintain price stability and, at the same time, provide environmental benefits consistent with reasonable cost and price stability.

Alternative Scenarios

Delmarva recognizes that there could be other procurement strategies that would be appropriate for Delaware. Thus, in conducting the IRP Delmarva explored three alternate scenarios and

[2] 25 *Del.C.*§1007(c)(1)(b).
[3] 25 *Del.C.*§1007(c)(1).

compared them to the current procurement strategy. For purposes of this comparison, the current procurement strategy will be referred to as the "Reference Case."

The three alternate scenarios considered by Delmarva are:

- Scenario Case #1 - add 150 MW of off-shore wind resources to Delmarva's existing 200 MW power purchase agreement with NRG Bluewater Wind – for a total of 350 MW of off-shore wind resources.

- Scenario Case #2 - add 150 MW of land based wind (on-shore) resources to the existing 150 MW power purchase agreements for land based wind resources with AES and Synergics for a total of 300 MW of land based wind resources;

- Scenario Case #3 - procure energy and capacity from a new 135 MW gas fired combined cycle generation resource located in Southern Delaware.

A summary comparison of the results of the three scenario cases to the Reference Case, as well as a discussion of the data presented, is provided in the "Integrated Plan - Comparison of Scenarios" section below.

The rest of this Executive Summary is presented as required by Section 3.2.1 of the IRP regulations. These regulations specify that the Executive Summary shall provide:

- A short description of the utility, including customers, service territory and current facilities
- A load forecast
- Integrated Plan – Comparison of Scenarios
- Planning objectives, measures, recent progress and action plans
- Notable areas of departure in the new IRP from the old IRP

II. <u>Delmarva Power</u>

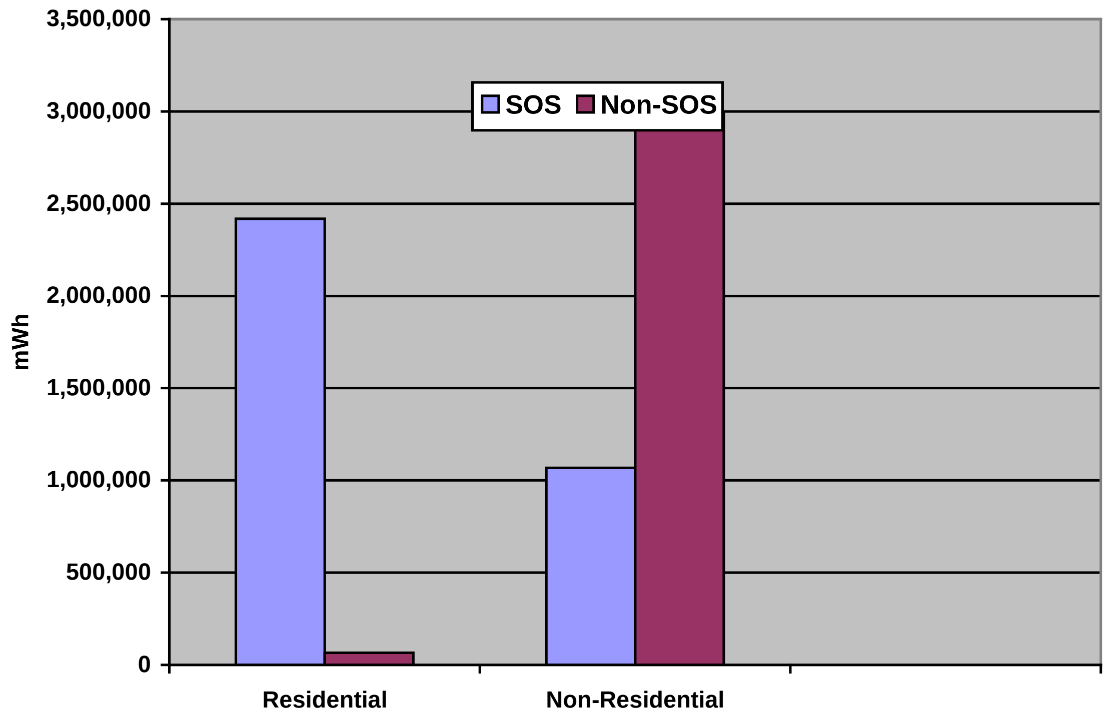
Delmarva Power is a 160 year old public utility company serving electric and gas customers in Delaware and the Eastern Shore of Maryland. In Delaware, Delmarva serves over 300,000 electric energy customers, of which about 267,000 are residential customers. Delmarva also serves over 123,000 natural gas customers all of whom reside in New Castle County. The IRP focuses only on electric customers.

With respect to delivery, Delmarva is an electric delivery company, focusing on the transmission and distribution of electricity to its customers. Delmarva's Delaware operations are managed out of four in-state offices, one each in Wilmington, New Castle, Millsboro and Harrington. Among Delmarva's assets in Delaware are almost 860 miles of high voltage (69kV and higher) transmission lines and 71 distribution and transmission substations. Delmarva does not own any power plants.

Under Delaware's electricity deregulation laws, Delaware customers can choose their own electric energy supplier. Those customers who do not choose a supplier are supplied by Delmarva through its Standard Offer Service (SOS) offering. As of October, 2010 about 97 % of Delmarva's residential customers are supplied under the SOS offering. In contrast, about 75% of non-residential usage is provided by third party suppliers. This IRP is focused on the procurement of the electrical requirements of the SOS customers only.

The breakdown of kWh usage by residential and non-residential customers, for SOS and Non-SOS service, for 2010 through September is shown in the following figure:

Figure 1



III. Load Forecast

The following table summarizes the load forecast for the IRP planning period 2011 - 2020:

Table 1

Baseline Forecast – Peak Demand (MW) & Energy Throughput (MWh)

Delmarva Delaware Total & SOS - 2011 & 2020

	2011 Delmarva Delaware		**2011 Delmarva Delaware SOS**		**2020 Delmarva Delaware**		**2020 Delmarva Delaware SOS**	
	MW	MWh	MW	MWh	MW	MWh	MW	MWh
Residential	859	2,987,883	834	2,900,947	994	3,411,773	979	3,312,503
Small Commercial	25	163,813	22	142,984	29	168,788	26	147,326
Large Commercial & Industrial	840	5,220,123	211	1,313,823	972	5,378,644	248	1,353,720
Street Lights	0	38,004	0	36,910	0	38,912	0	37,791
Total	**1724**	**8,409,823**	**1067**	**4,394,664**	**1995**	**8,998,117**	**1253**	**4,851,341**

The Load Forecast is described in more detail in Section 3a of the IRP. Appendix 3 provides documentation of the forecast preparation.

IV. Integrated Plan - Comparison of Scenarios

The following discussion compares the results of the Reference Case with the three Scenario Cases along the key dimensions of price, price stability, and environmental benefits.

Electricity Price and Price Stability

Table 2 below shows the expected mean energy prices in real dollars (2010 dollars) for Residential and Small Commercial (RSCI) and Large Commercial (LC) SOS customers for the Reference Case compared with the Scenario cases for selected planning years.

Table 2 Expected Energy Prices in $2010 RSCI and LC SOS Customers
CONFIDENTIAL MATERIAL OMITTED

Planning Year Scenario	**SOS RSCI**		**SOS LC**	
	Total Average Costs ($/MWh)	**Delta (%)**	**Total Average Costs ($/MWh)**	**Delta (%)**
Settlement Period: Planning Year 2011 Reference Case				

Settlement Period: Planning Year 2013				
Reference Case				
Settlement Period: Planning Year 2015				
Reference Case	$96.41		$86.92	
Reference Case and CC South	$97.72	**1.4%**	$88.22	**1.5%**
Reference Case with Wind (Land Based)	$98.21	**1.9%**	$88.71	**2.1%**
Settlement Period: Planning Year 2017				
Reference Case	$114.50		$102.26	
Reference Case and CC South	$114.62	**0.1%**	$102.38	**0.1%**
Reference Case with Wind (Land-Based)	$116.06	**1.4%**	$103.84	**1.5%**
Reference Case with Wind (Off-Shore)	$120.00	**4.8%**	$107.84	**5.5%**
Settlement Period: Planning Year 2020				
Reference Case	$127.64		$119.09	
Reference Case and CC South	$126.37	**- 1.0%**	$117.82	**- 1.1%**
Reference Case with Wind (Land-Based)	$126.98	**- 0.5%**	$118.43	**- 0.6%**
Reference Case with Wind (Off-Shore)	$131.75	**3.2%**	$123.20	**3.5%**

The Table indicates that, for the Reference Case, energy supply prices are expected to rise over the planning period 2011-2020 for both RSCI and LC SOS customers. {Confidentioal Material Omitted}

A primary reason for this increase in energy prices is the expected implementation of stricter Federal environmental regulations for fossil fired generation resources[4]. Within this Table, the price performance of the scenario cases relative to the Reference Case improves over time.

Importantly, the results for the off-shore wind scenario shown in Table 2 assume the current contract prices for the Bluewater Wind Project for the additional off-shore wind purchase. Likewise, the results for the land-based wind case assume contract prices similar to Delmarva's existing land-based wind contracts. The results in Table 2 do not include the environmental benefits of the scenario cases which are discussed later in this IRP.

[4] The sensitivity of these results to future environmental regulations is examined later in this IRP.

Table 3 presents a projection of retail customer energy supply rates for Residential and MGT customers for the period 2011 through 2015. The projections are based on the Reference Case and are also in real dollars (2010$).

Table 3: Customer Energy Supply Rate Projections (2010$)

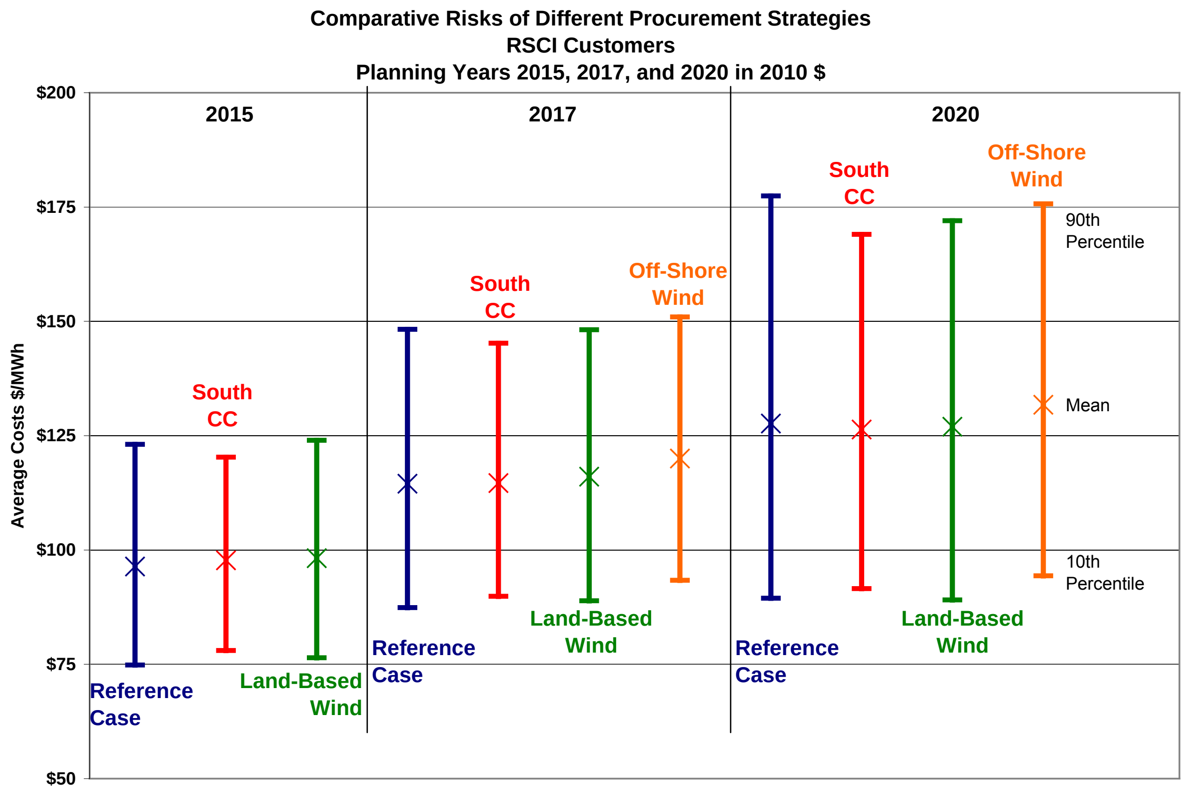
Confidential Data Omitted

Real Dollars (2010$)

Planning	Residential Rates (Tariff "R")				MGT-S Rates			
Year	Demand ($/kW)		Energy (Cents/KWH)		Demand ($/kW)		Energy (Cents/KWH)	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Currently Effective	-	-	11.04	10.07	14.00	9.20	4.59	5.91
2011	-	-						
2012	-	-						
2013	-	-						
2014	-	-	11.49	10.76	15.58	9.68	5.02	6.14
2015	-	-	11.90	11.14	16.20	10.06	5.21	6.38

In order to evaluate price stability, Delmarva prepared an analysis showing the expected range of prices for the Reference Case and the Scenario Cases over the planning period. Figure 2 below shows a graphical comparison of the results of this analysis.

Figure 2



In Figure 2, 10% of the possible price outcomes for that case occur above the "top" of each line and 10% occur below the "bottom" of the line. The cross mark in between the top and bottom shows the average across all potential outcomes. Overall, Figure 2 shows that the expected range of prices is increasing over time for the Reference Case and the Scenario Cases. Figure 2 also suggests that the range of potential price outcomes for the Scenario Cases is somewhat less than the Reference Case – i.e. they offer slightly greater price stability because some of the supply prices are fixed.

Environmental Benefits – Emission Levels

As part of the IRP, Delmarva prepared an analysis of the expected power plant emissions occurring over time for the Reference Case and the Scenario cases. The following charts (figures

3 – 6) compare the emissions of Carbon Dioxide (CO2), Sulfur Dioxide (SO2), Nitrous Oxide (NOX), and Mercury (Hg) expected from power plant generation in Delaware during 2011, the first year of the ten year IRP planning period, with their expected level of emissions for the Reference Case and the three scenario cases in 2020, the last year of the IRP planning period.

Figure 3

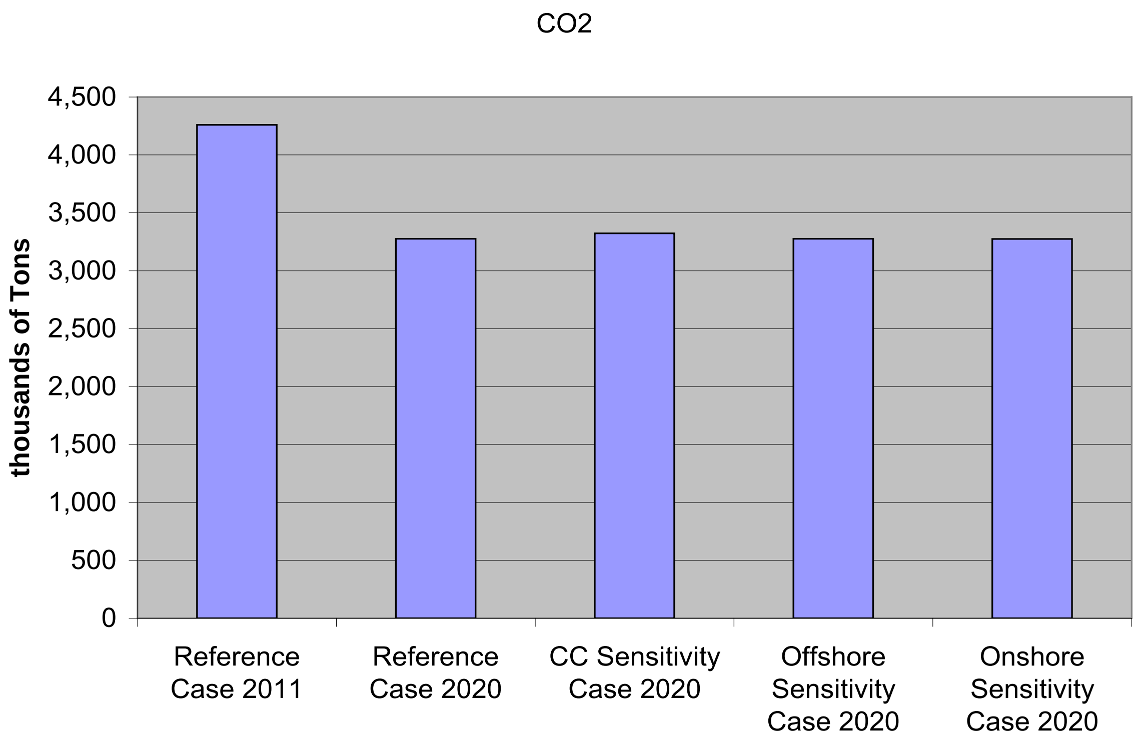


Figure 4

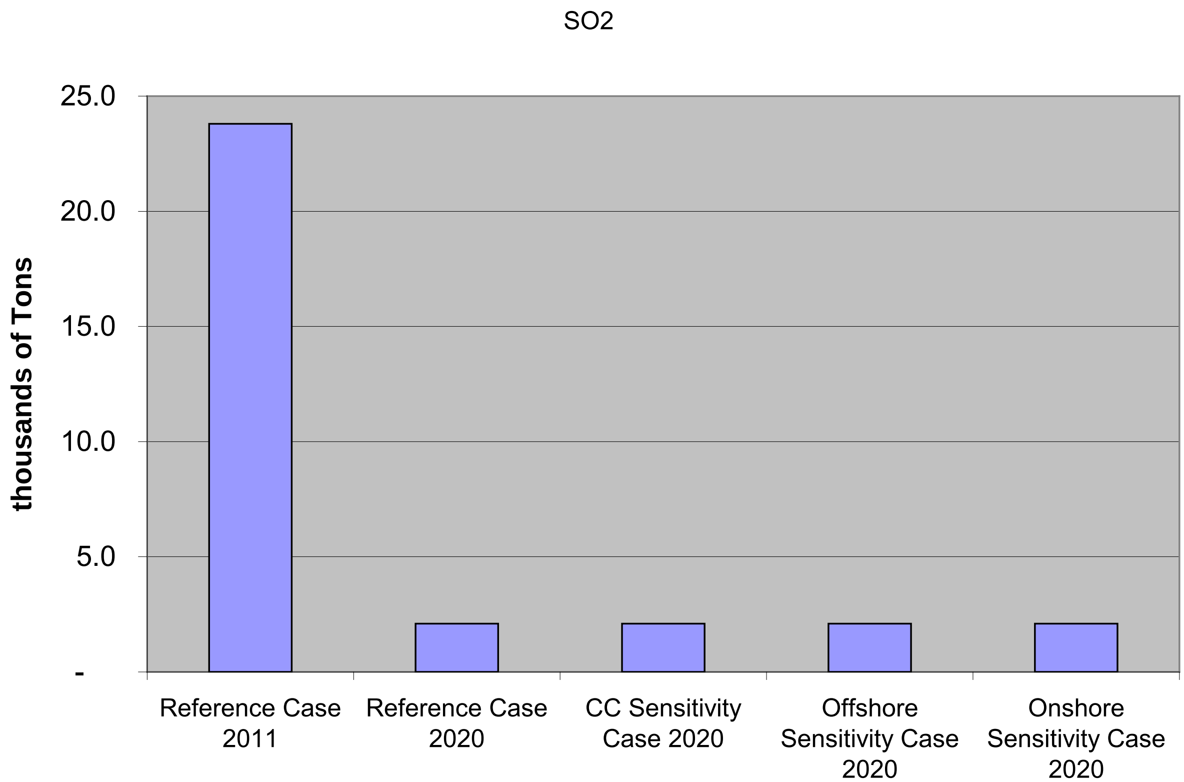

SO2
thousands of Tons
25.0
20.0
15.0
10.0
5.0
-
Reference Case 2011
Reference Case 2020
CC Sensitivity Case 2020
Offshore Sensitivity Case 2020
Onshore Sensitivity Case 2020

Figure 5

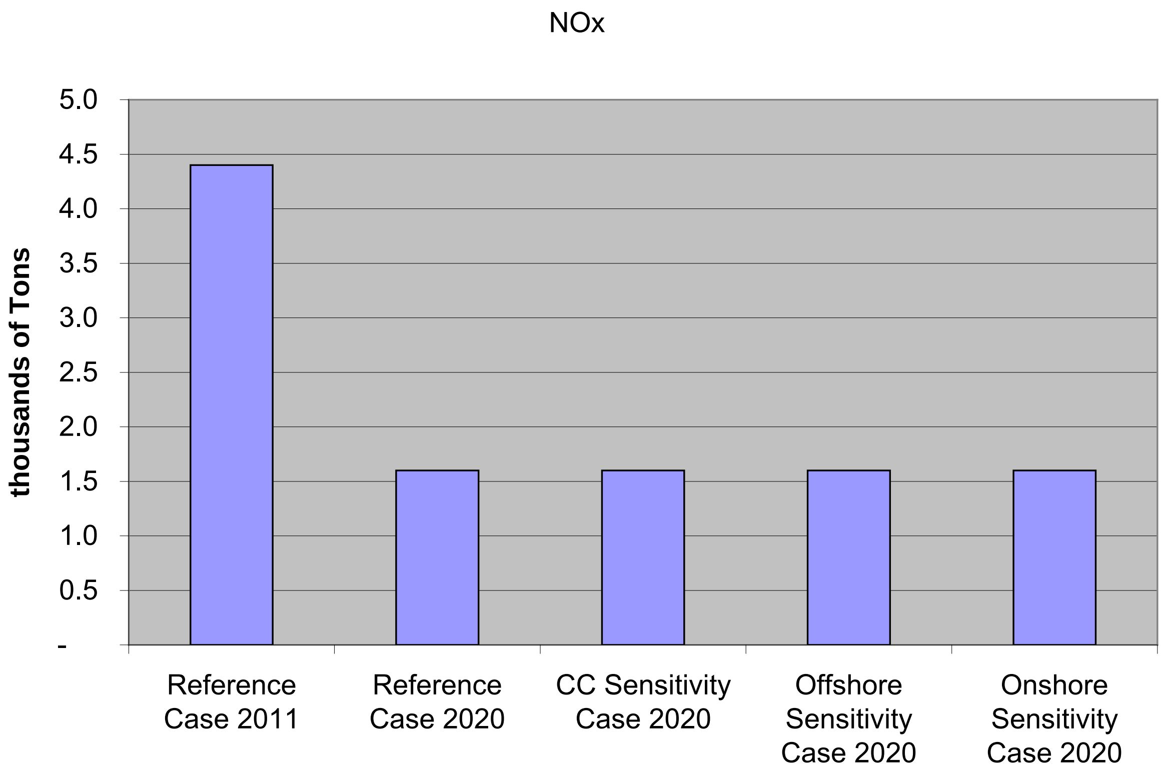
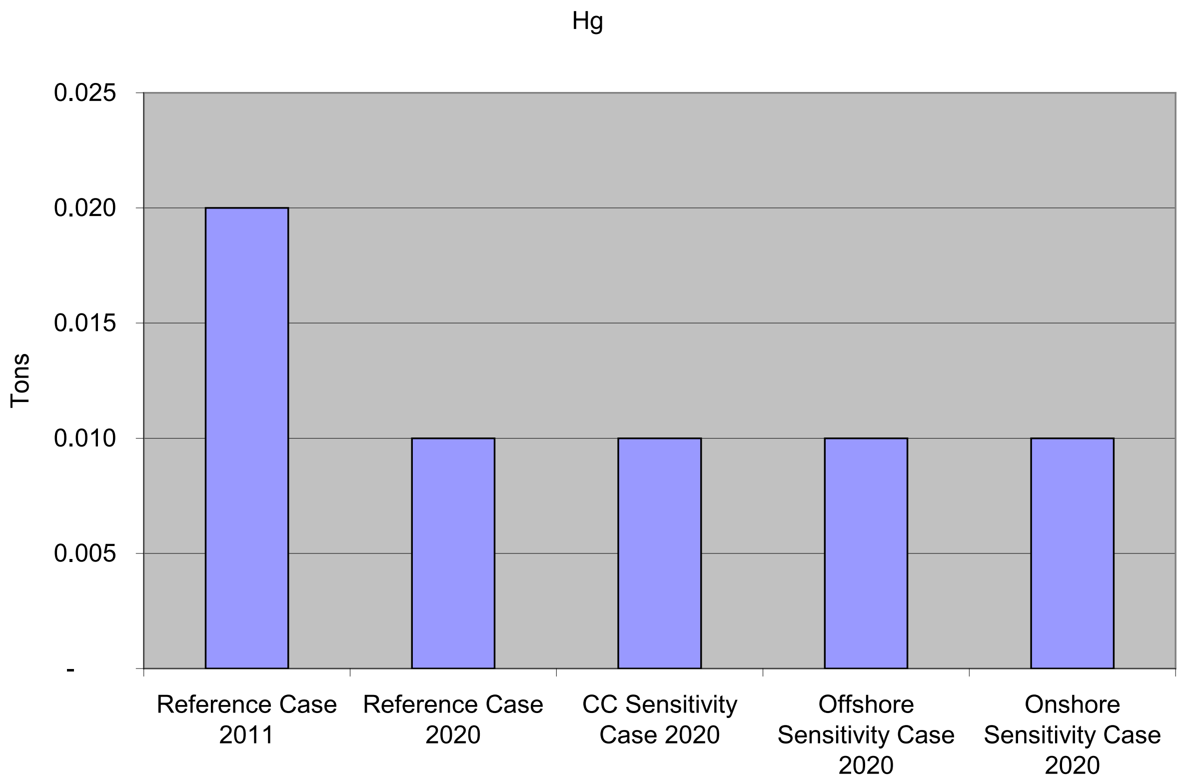

NOx
thousands of Tons
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-
Reference Case 2011
Reference Case 2020
CC Sensitivity Case 2020
Offshore Sensitivity Case 2020
Onshore Sensitivity Case 2020

Figure 6



These charts indicate that in the Reference Case emissions of CO2, SO2, NOX, and Hg are expected to decline significantly in Delaware over the ten year IRP planning period. One reason for this decline is that federal and regional clean air standards are tightening over this time frame. However, other factors in this decline are the actions that Delaware has taken to increase renewable generation, reduce electric energy consumption and demand, and reduce and provide better emission controls for electric generation from coal resources. Collectively, these federal, regional and local actions are expected to significantly lower power plant emissions and improve air quality in Delaware.

The charts also suggest that expected 2020 emissions in Delaware for SO_2, NO_x and mercury are similar across all of the four cases. Only for CO_2 does one scenario, the combined cycle case, have more CO_2 emissions in Delaware in 2020 as compared to the other cases.

The analysis of the power plant emissions resulting from the Scenario Cases reveals the dynamic and integrated nature of the larger regional power market. Adding additional generation in

Delaware causes changes not only in the production of other generation resources but in the expected timing and location over time of other new generation resources. In other words, the regional power market is always seeking to balance supply and demand and when a resource is added to the mix, the market makes changes in the present and over time as it moves to rebalance the system.[5]

V. Environmental Benefits – Impacts on Human Health

The change in power plant emissions over time can be used to evaluate the change in ozone and particulate matter that affects air quality and impacts human health in Delaware. Using environmental modeling tools developed by the US Environmental Protection Agency (EPA) and available in the public domain, Delmarva has estimated the human health impacts for the Reference Case as compared to the Scenario Cases from an air quality base line of 2010. The methods and procedures of the analysis are described in Section 3e and Technical Appendix 6 of the IRP.

Due to the uncertainty surrounding the preparation of the estimated impact of changes in air quality on human health, the estimates are presented as a range of values as opposed to a single value. Table 4 below shows the estimated range of monetized human health benefits as derived from the EPA models that are expected to occur for Delaware resulting from the decrease in power plant emissions in the Reference Case from 2010 to 2020.

Table 4
Total BenMAP Aggregated Valuation Results for $PM_{2.5}$ and Ozone for Reference Case Changes 2010- 2020 ($2008 in Millions).

	Delaware	
	High End	Low End
2010-2020		
PM-Mortality (Laden, 3% discount rate)	3,900	—
PM-Mortality (Pope, 7% discount rate)	—	1,400

[5] More details on the expected generation mix in the Reference Case and the Scenario Cases are provided in Section 4 of the IRP.

PM-Morbidity	86	86
Ozone-Mortality (Levy)	350	350
Ozone-Morbidity	6	6
Total	*4,342*	*1,842*
Total (2 significant figures)	**4,300**	**1,800**

More PM-Mortality estimates are presented in Appendix 6 based upon a number of expert studies. In Table 4 only the highest value (Laden) and lowest value (Pope) are presented.

The estimated human health benefits arising from the Reference Case by 2020 shown in Table 4 are very significant. These results are affected by the expected reductions in power plant emissions that can be attributed to a number of factors including:

- The expected retirement of over 15 GW of coal fired generation in PJM by 2020,
- Expected reductions in emissions from remaining coal generation,
- Large increases in the expected implementation of renewable resources within Delaware and other Mid-Atlantic regions (including Delmarva's renewable resource portfolio),
- The expected construction of 17 GW of new gas-fired generation within PJM,
- Implementation of tighter Federal and regional environmental regulations
- Ongoing demand side management activity including the implementation of smart grid technology and associated dynamic pricing and load control programs.

These factors, as well as other factors not related to power generation resources, contribute to greatly improving air quality and human health over the 10 year planning horizon. The addition of renewable (i.e., off-shore and on-shore wind) and combine cycle generation resources to the generation mix over what is already anticipated in the Reference Case will not greatly influence the range of expected human health benefits in 2020. More details on this analysis are provided in a detailed technical summary report in Technical Appendix 6.

<u>Environmental Benefits- Life Cycle Analysis</u>

Life Cycle Assessment (LCA) is a quantitative, "cradle-to-grave" evaluation of the environmental and human health impacts of products, services and systems, and includes all processes associated with extraction of raw materials, processing of materials, transportation, energy inputs, production, use, distribution, recycling, waste treatment, and disposal. Delmarva used the draft ANSI SCS-002 Life-Cycle Stressor-Effects Assessment (LCSEA) standard to evaluate the environmental performance of the proposed electric power generation systems in the three scenarios cases compared with the Reference Case on a comprehensive, technology-neutral and fuel-neutral basis. The methods and procedures of the analysis are described in Section 3e and Technical Appendix 7 of the IRP.

The end result of the environmental LCA are the Environmental Power Declarations for the offshore, onshore and combined cycle gas scenarios which are presented below in Figures 7, 8 and 9, respectively.

The Environmental Power Declarations provide a visual summary of the system impact profile (impact indicator results) as compared to the Reference Case profile, which is indicated by the vertical line. Figures 7 and 8 show that both the offshore and onshore wind scenarios have a minimal impact profile in comparison to the Reference Case. Figure 9 depicts the combined cycle gas scenario which has a greater impact profile in comparison to the Reference Case and to the two wind scenarios.

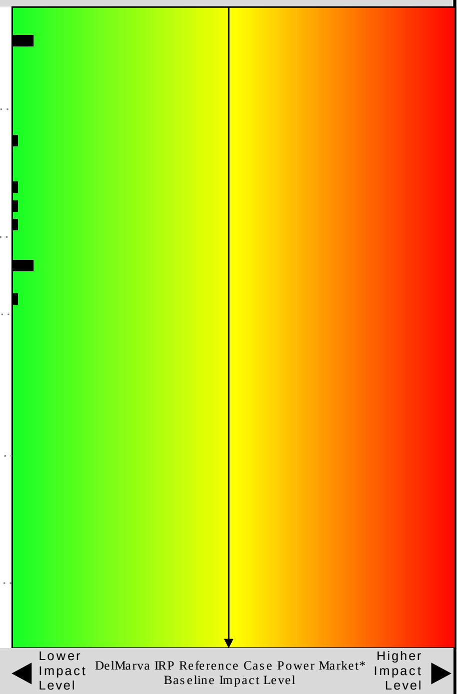
Figure 7
Environmental Power Declaration for 150 MW Offshore Wind Scenario

ENVIRONMENTAL POWER DECLARATION

Delmarva 150 MW Offshore Wind Scenario

Relevant Impact Categories	IMPACT LEVELS (per 1000 GWh)	
EXTRACTED RESOURCE DEPLETION		
Energy Resources	108,440	Barrels of Oil equivalents
Water Resources		Gallons
Strategic Material Resources		Metric tons copper
Biobased Resource Depletion		
LANDSCAPE DISTURBANCE LEVEL		
Terrestrial Ecosystem		negligible
Aquatic (River) Ecosystem		
Aquatic (Lake) Ecosystem		
Aquatic (Oceanic) Ecosystem		negligible
Riparian & Wetland Ecosystem		negligible
Loss of Key Species		negligible
CLIMATE CHANGE EMISSIONS		
Global GHG Profile	62,954	Tons of CO_2 equivalents
Arctic GHG Profile		Metric tons of CO_2 equivalents
Regional CF Cooling		negligible
EMISSIONS WITH ENVIRONMENTAL EFFECTS		
Oceanic Acidification	0	Tons of CO_2 equivalents
Regional Acidification		Metric tons of SO_2 equivalents
Stratospheric ODC Loading		
Ecotoxic Potentials		kg Se eq.
Aquatic Eutrophication		kg phosphate eq.
Terrestrial Eutrophication Loading		
Viewshed Obstruction	147	Persons affected (*No bar displayed*)
EMISSIONS WITH HUMAN HEALTH EFFECTS		
Ground Level Ozone		persons*ppm ozone*hours
PM 2.5 Exposures		persons*µg PM2.5 eq./m^3
Regional Toxic Air Chemicals		Persons*eq. µg benzene/m^3
Indoor Air Chemicals		Eq. µg formaldehyde/ m^3 above CREL
Bioaccumulative Toxicity Potentials		
Auditory Exposure Over Threshold	18	Persons over threshold (*No bar displayed*)
RESIDUAL RISKS FROM HAZARDOUS WASTES		
Risks from Radioactive Wastes		
Risk from Other Untreated Hazardous Wastes		

Impact Levels



SCS

•Based on Life-Cycle Impact Assessment (SCS-002)

•Power Market includes DE, NY, NJ, OH,PN, MD,VA,WV and Dist. of Columbia

Figure 8
Environmental Power Declaration for 150 MW Onshore Wind Scenario

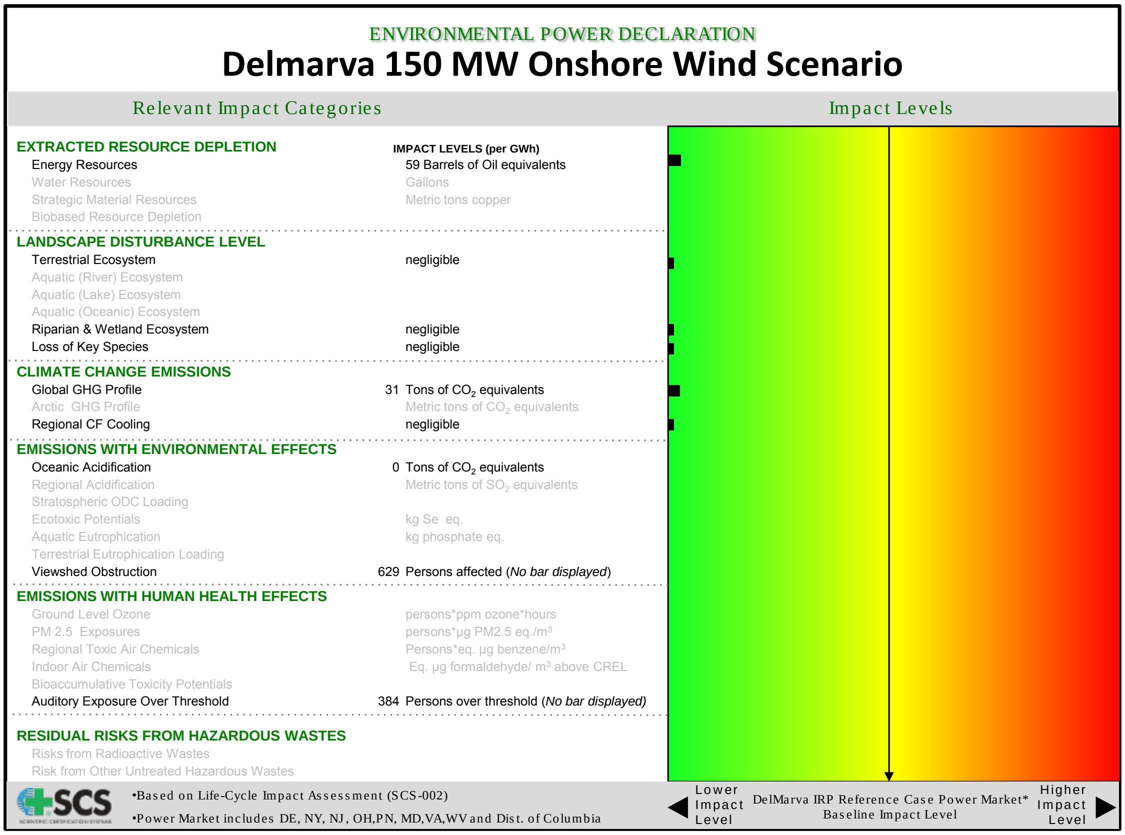
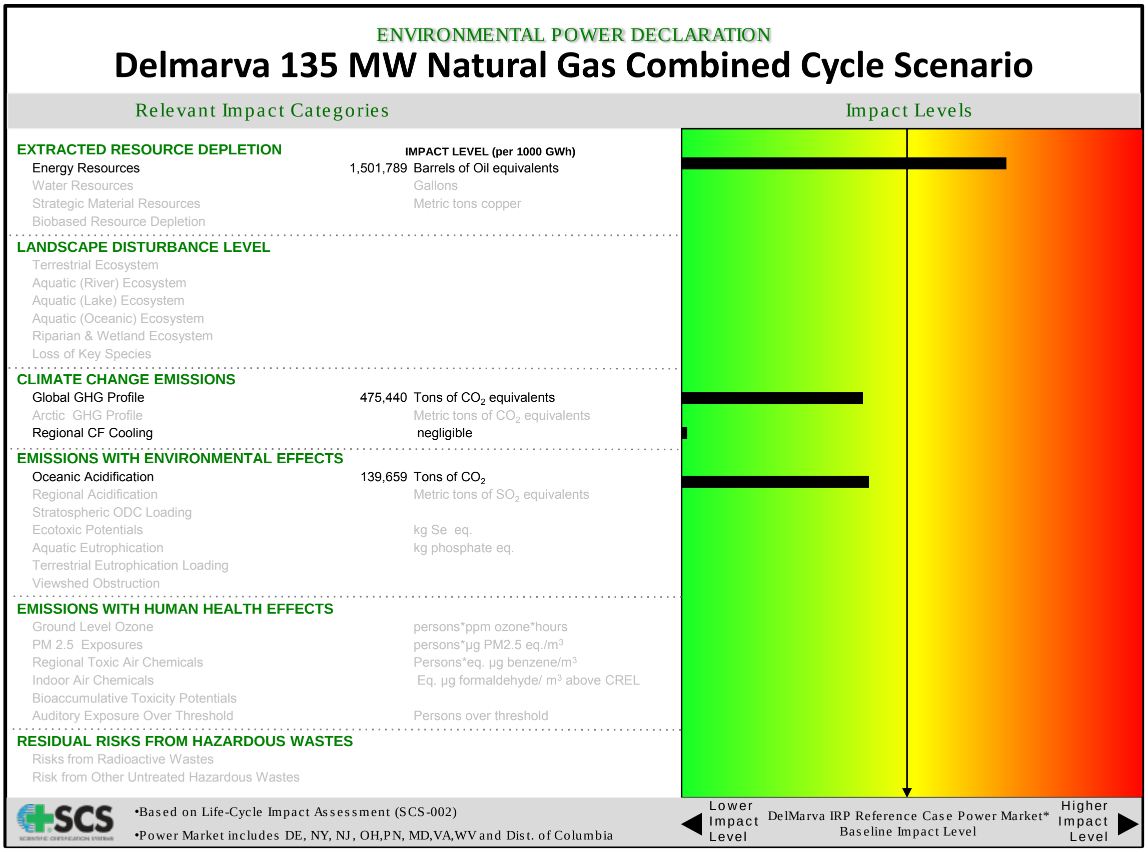


Figure 9
Environmental Power Declaration for 135 MW Combined Cycle Gas Scenario



VI. Recommended Path Forward

Delmarva's current procurement strategy, which has been developed and refined on an on-going basis over the years, has been to:

1. Procure a series of laddered three year contracts for Full Service Requirements Agreements (FSA) energy for Residential and Small Commercial SOS customers and one year FSAs for Large Commercial SOS customers,
2. Construct a portfolio of renewable energy resources to provide for the needs of RSCI and LC customers which increases in size over time consistent with the requirements of the Delaware Renewable Portfolio Standards (RPS), and,

3. Bundle the renewable portfolio together with the FSA's to complete the procurement of electrical requirements for SOS customers.

This strategy has provided SOS customers with reasonable and stable energy prices. The renewable portfolio included in this strategy includes the procurement of over 350MW of nominal capacity of a diverse mix of land-based wind, off-shore wind, and solar resources to support SOS customer requirements. Further, the reduction in power plant emissions expected under the Reference Case between 2011 and 2020 provides significant improvements in air quality and health benefits for the State of Delaware. Based upon EPA models of air quality, the range of expected health benefits under the Reference Case occurring in 2020 relative to 2010 in Delaware is $1.8 B to $4.3 B. Delmarva's current procurement strategy provides an appropriate balance to secure reliable and reasonable cost energy supply, provide price stability and environmental benefits and should be continued.

In addition to procurement activities, Delmarva Power has a significant amount of Demand Side Management activity linked to the roll-out of smart meter and smart grid technology. The continued focus on reducing usage and lowering peak demand are good supplements to the recommended procurement practices. The roll-out and subsequent implementation of creative dynamic pricing and load control programs are important elements to reducing our supply needs.

VII. <u>IRP Planning Objectives</u>

Delmarva has five planning objectives for its procurement of SOS supply obligations in Delaware. For each of these five objectives, the following discussion includes objective measures, progress since the November 2008 IRP towards meeting the objective and action plans for the future.

1. <u>Reasonable Cost and Price Stability</u>

Objectives:

a) Delmarva will evaluate generation, transmission and demand side resource options during the planning period to ensure that sufficient and reliable resources to meet customer needs are acquired at a reasonable cost.
b) Delmarva will seek to provide year over year price stability in the prices paid by SOS customers for their total electricity supply.

Measures:

a) Obtain Commission acknowledgement that the IRP does not appear to be unreasonable in meeting these objectives.
b) Annually provide the Commission information showing changes in rates and procurement cost adjustments

Progress since 2008

As the following table illustrates, since 2008 Delmarva's RSCI SOS supply process has been able to meet customer needs while lowering supply prices.

Table 5

DE SOS Procurement – Monthly Retail Bill Comparison for 12 Month Procurement Period			
2009 over 2008		2010 over 2009	
%	$	%	$
- 0.1%	-$0.07	- 0.8%	-$1.61

Delmarva's strategy of procuring laddered, three year full requirements service (FRS) contracts, has been the primary basis for providing reasonable cost and stable-priced electricity. While slowing economic activity during the 2008/09 recession has helped keep electricity prices stable, the availability of low priced natural gas for mid-Atlantic electric generation markets should continue this trend, even should economic activity pick up from recession lows.

.

Action Plan:

The following actions are expected to occur in the next two years:

a) In accordance with EURCSA, the Company will prepare and file an Integrated Resource Plan at least once every two years. The IRP will include a systematic evaluation of generation, transmission, and demand side resource options. Under this schedule, Delmarva will file the next IRP on or before December 1, 2012.

b) The IRP will provide an evaluation of various resource mixes showing both the expected outcome in terms of average price and the potential range of outcomes around the expected price.

c) To the extent that Delmarva is requested to enter into a long term energy supply agreements that have the potential to create customer migration risk, an appropriate cost recovery mechanism will need to be implemented. See Appendix 9 for a proposed cost recovery plan.

2. Reliability

Objective:

a) Ensure that the electric system serving Delmarva's customers meets all NERC, PJM and Delaware transmission electrical reliability requirements.

Measures:

a) Schedule for completing PJM approved zonal RTEP projects as listed on the "RTEP Construction Status" page on the PJM Website (www.pjm.com).

b) Reliability standards in DE PSC Docket 50 "Electric Service Reliability and Quality Standards." From Section 4 of that document, transmission "Reliability and Quality Performance Benchmarks" include:

i. Transmission CAIDI & SAIDI (excluding major events) as part of the overall system CAIDI and SAIDI

ii. Constrained hours of operation

Progress since 2008

The following table summarizes the transmission system upgrades made since November 2008.

Table 6

Description	In-Service Date	Cost ($M)
Edge Moor Sub - Replace overstressed breakers	5/16/2008	$0.527
Red Lion Sub - 500/230kV work	6/8/2009	$13.335
Replace Keeney 230 kV breaker 231 + 232	5/7/2008	$0.974
Replace 1200 Amp disconnect switch on the Red Lion - Reybold 138kV circuit	5/31/2009	$0.049
Reconductor 0.5 mi of Christiana / Edgemoor 138kV line	11/19/2009	$0.187
Replace 1200 Amp wavetrap at Indian River on the Indian River - Frankford 138kV line	9/8/2010	$0.184
Replace 1600A disconnect switch at Harmony 230 kV and for the Harmony -Edgemoor 230kV circuit, increase the operating temperature of the conductor	7/8/2009	$0.094
Raise conductor temperature of North Seaford - Pine Street - Dupont Seaford 69kV	7/16/2009	$0.104
Rehoboth/Cedar Neck Tap (6733-2) upgrade	4/18/2008	$4.934
Upgrade Laurel - Mumford 69kV line operating temperature of 477 ACSR @ 125C to 140C	5/31/2009	$0.222
Create a new 230kV station that splits the 2nd Milford to Indian River 230kV line. Add a 230/69kV transformer and run a new 69kV line down to Harbeson 69kV (Cool Springs)	6/10/2010	$14.504
N. Seaford - Add a 2nd 138/69kV autotransformer	5/27/2008	$5.981
Indian River AT-1 and AT-2 138/69kV Replacements	5/31/2009	$7.530

Upgrade the Christiana - New Castle 138kV circuit	8/14/2009	$0.517
Keeney PRA 500/230kV Transformer	4/15/2008	$2.533
Keeney PRA 500/230kV Transformer (Monitoring Equip)	5/31/2008	$0.277
Rebuild Millsboro - Zoar REA 69 kV	12/31/2008	$1.004
Install a 2nd Red Lion 230/138kV	5/13/2009	$2.631
Hares Corner - Relay Improvement	5/13/2009	$0.359
Reybold - Relay Improvement	5/13/2009	$0.082
New Castle - Relay Improvement	5/4/2009	$0.072
Bethany 69 kV - Add 30 MVAR of capacitors (Replace the existing 12 MVAR)	2/16/2010	$0.982
Bethany 138 kV - Add a 138/12kV transformer which will replace Bethany T1 69/12kV	8/14/2010	$5.012
Darley - Silverside 69kV Rebuild	12/31/2010	$1.210

In addition, in March 2010, Delmarva provided updates to the Commission as part of the annual Docket 50 transmission standards targets.

Action Plan:

The following will occur annually during the next two years;

a) Provide updates of PHI's Mid Atlantic Power pathway (MAPP) project.

The following are expected to occur annually for the next five years:

a) Complete all approved PJM RTEP Delmarva Zone projects by required in-service dates.

b) Provide updates for annual Docket 50 transmission standards targets (in "Reliability Planning and Studies Report" - submitted annually in March for the current calendar year) and performance (in "Reliability Performance Report" - submitted annually in April for the previous calendar year).

3. Renewable Energy

Objectives:

a) obtain Renewable Energy through a diverse portfolio of renewable energy resources at reasonable cost.

b) as part of the IRP, prepare a plan to obtain renewable energy from land-based and off-shore wind and potentially other renewable energy resources over the planning period sufficient to meet the requirements as specified by the State of Delaware Renewable Energy Portfolio Standards for its SOS customers. These other reasonably priced renewable resources may be considered where appropriate and beneficial to customers.

c) prepare a plan to obtain sufficient solar resources to meet the State of Delaware's RPS.

d) avoid alternative compliance payments under the State RPS.

Measure:

Meet the annual RPS requirements for SOS customers through a portfolio of contracted wind and solar resources, SRECs purchased from the SEU, and balanced with purchases from competitive short-term markets. Minimize compliance payment requirements.

Progress since 2008

Prior to filing the Third Update to the IRP on November 5, 2008, the Delaware Public Service Commission approved a 200 MW Wind Power Purchase Agreement for offshore wind between Delmarva and Blue Water Wind (September 2, 2008, Order No. 7440). The Commission also approved three power purchase agreements between Delmarva and land based wind developers for a total of 140 MW of land-based wind (October 7, 2008, Order No. 7463).

The Blue Water Wind (BWW) project is still in the early development stage – in August 2010 BWW requested a two year delay in the target date for delivering energy, from December 1 2014 to December 1, 2016. In Order No. 7835, issued September 7, 2010, the Commission approved an amended agreement between Delmarva and BWW to accommodate that request.

Delmarva is currently receiving energy and RECs from one of the three land-based projects – the AES owned, 100 MW Armenia Mountain wind farm located in Tioga and Bradford Counties, Pennsylvania. Delmarva is acquiring up to 50 MW of energy and RECs from that project, which went on line in November 2009 and was declared commercially available in December 2009. AES is headquartered in Arlington, VA.

The other two approved wind projects, which are being developed by Synergics of Annapolis, MD, include the 40 MW Roth Rocks Wind Energy project, expected to be commercial by the end of 2010 and the 60 MW Eastern Wind Energy project, also expected to be commercial by the end of 2010. Both projects are located in Garrett County, MD and Delmarva will be taking all of energy and RECs created by these projects.

In May 2010 Delmarva agreed to participate in the 10 MW Dover Sun Park to be constructed on 103 acres in the 389 acre Dover owned Garrison Oak Technology Park. The project originated in a competitive solicitation sponsored by Dover and, in addition to Delmarva's involvement, also includes participation by DMEC and the SEU.

On September 7 the Commission approved Delmarva's Dover SUN Park contracts. The solar power plant will be owned by White Oak Solar Energy, an affiliate of LS Power.

The project is expected to be on-line in the summer of 2011. Delmarva will be taking 70% of the SRECs generated by the facility for 20 years.

Action Plan:

The following are expected to take place within the next two years:

1. Begin receiving energy and REC's as part of the SOS customer portfolio from the following executed and approved contracts from land-based wind generators according to the following schedule:
   a. Synergics Roth Rock Wind Energy: 40 MW wind facility located in Western Maryland with a guaranteed initial delivery date of December 31, 2010; and,
   b. Synergics Eastern Wind Energy: 30 to 60 MW wind facility located in Western Maryland with a guaranteed initial delivery date of December 31, 2010.
   c. Existing contracts for wind generated resources effectively supply sufficient Renewable Energy Credits (RECs) to meet Delmarva's SOS supply needs through the planning period. Delmarva will continue to monitor the development of the resources and be prepared to competitively secure additional resources in a timely manner in the event that any of the resources are delayed or do not materialize
   d. The Dover Sun Park to be complete in the summer of 2011 will provide sufficient Solar Renewable Energy Credits (SRECS) through 2011. Delmarva expects that the SRECs from the Dover Sun Park will be supplement by SRECs procured for customer-sited facilities and

supplied to the utilities in the State by the Sustainable Energy Utility (SEU). Delmarva's plan for procuring solar renewable energy will be revised based on recommendations of the Renewable Energy Task Force RETF). It is expected that the RETF will recommend a mechanism for the SEU to procure SRECs from customer-sited solar facilities to be banked and then resold to Delmarva through a Commission approved contractual arrangement. Delmarva has available the SRECs generated by the Dover Sun Park and banked by the SEU to help meet any shortfalls in the near term and will be prepared to competitively procure additional solar resources as needed.

Within the next five years progress is expected on the following:

e. Bluewater Wind: 200 MW from an off-shore wind facility to be constructed 11 miles of the coast of Delaware at Rehoboth Beach. The guaranteed initial delivery date of December 1, 2016

2. Obtain the SRECs associated with solar photovoltaic resources sufficient to meet the Delaware RPS.

4. Demand Response

Objective:

Implement utility provided, technically feasible, and cost effective demand response programs with a focus on contributing towards meeting the peak demand reduction goals of 2% by 2011 and 15% by 2015 of the Energy Conservation and Efficiency Act of 2009.

Measure:

Peak demand reduction capability and achievements will be measured each year beginning in 2011.

<u>Progress since 2008</u>

The Delaware Commission approved Delmarva's deployment of an AMI System pursuant to Commission Order No. 7420, issued on September 16, 2008, in Docket No. 07-28. Delmarva is currently installing an AMI System in its Delaware service territory.

After the deployment of the system is completed, Delmarva will be able to collect hourly energy use data for all of its electricity customers on a daily basis. The availability of detailed energy use data will permit the Company to establish new rate options that provide more accurate energy price signals to customers.

The proposed rate options are expected to reduce electricity demand during high energy priced periods, provide financial benefits to customers who reduce their electricity use during periods of high price, help the Company to achieve the demand reduction goals established through Delaware's Energy Conservation & Efficiency Act of 2009 ("the Energy Efficiency Act")[6], and help to mitigate electricity prices for all Delmarva Power customers.

Delmarva plans to integrate its existing residential air conditioner cycling program, the Energy for Tomorrow Program, and a new smart thermostat/switch air conditioner cycling programs into the operation of the dynamic pricing program. Cycling events will coincide with critical peak periods, although they could occur during other time periods in response to system conditions. Participating customers billed under dynamic pricing rates would be compensated through the applicable dynamic pricing rate schedule.

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[6] This legislation requires each "Affected Electric Energy Provider" to achieve energy and peak demand savings that is equivalent to 2% of the provider's 2007 electricity consumption and to achieve non-coincident provider peak demands to 2% of the provider's 2007 peak demand by 2011, increasing to 15% by 2015.

Action Plan

1. Work with the Commission Staff and other parties to finalize a plan (including education plan) and implementation time schedule.
2. Seek and obtain necessary regulatory Commission approvals of required tariffs and implementation plan.
   a. Residential Direct Load Control Filing: 1st Quarter 2011
   b. Dynamic Pricing Filing Target: 1st Quarter 2011
   c. Non-Residential Direct Load Control Filing:3rd Quarter 2012
3. Implement approved plan and begin customer education effort.
   a. Direct Load Control: Market to Customers and Install Equipment
   b. Dynamic Pricing: Educate Eligible Customers

5. Energy Efficiency

Objective:
Collaborate with the SEU on the implementation of SEU selected programs. SEU selected programs will contribute towards meeting the Energy Conservation and Efficiency Act of 2009 savings targets of 2% of the 2007 electricity consumption by 2011, increasing to 15% by 2015.

Measures:
Achieved energy reductions will be measured beginning in 2011 by the SEU.

Progress since 2008

The Delaware Legislature created the Delaware Sustainable Energy Utility ("SEU") in 2007 to coordinate and promote the sustainable use of energy in Delaware. The SEU was given responsibility for implementing energy efficiency and conservation programs in Delaware. In May of 2009, the Delaware legislature passed the Energy Conservation & Efficiency Act of 2009 (the "Act") The Act specifies target energy and demand reduction goals of 15% by 2015. The Act also requires that Delmarva attain the demand and energy reduction goals in coordination with the SEU and the Delaware Weatherization Assistance Program ("WAP") and, further, to submit a report annually to the State Energy Coordinator which demonstrates the achieved cumulative Energy Savings[7] in the previous calendar year that are at least equal to the energy savings required by these regulations.

An SEU analysis resulted in five currently offered programs: two residential, one commercial and two for institutions and non-profits. Additional funding availability through Federal Stimulus funds are currently supporting rebates for high efficiency appliances. There are approximately seven additional programs which are in varying stages of program design and final SEU Board approval. Two of the currently offered SEU programs, ENERGY STAR® Appliance Rebate Program and Standard Lighting Program for Business, are rebate programs supported in part by funds from the American Reinvestment and Recovery Act.

Action Plan:

1. Energy efficiency programs selected and designed by SEU. Selection criteria are determined by SEU.
2. Implement program plans and revise as needed.
3. Collaborate with SEU in the development and implementation of SEU programs.

6. Utility Provided Energy Efficiency Programs

Objective: Implement utility energy efficiency initiatives (transmission improvements, street lighting, and possibly a Combined Heat and Power (CHP) program)

[7] "Energy Savings" means (i) reduction in electricity consumption, (ii) reduction in natural gas consumption, (iii) electricity coincident peak demand response capability, or (iv) equivalent energy efficiency measures, in Delaware from a base year of 2007, calculated on a calendar year basis.

Measure: Provide annual achieved energy savings beginning 2011.

Action Plans:

a. Implement transmission improvement measures as described in the RTEP.

b. Continue streetlight improvement plan begun in 2008

c. Work with SEU to determine CHP program responsibility.

VI. Notable Areas of Departure from 2008 IRP

A notable area of departure in this IRP from the prior IRP is the additional consideration given to environmental benefits, an externalities assessment which includes an analysis of the air quality impacts and human health benefits and the life-cycle analysis associated with the Reference Case and Scenario Cases. (See Technical Appendices 6 and 7)

A second major area of departure is that the in-service date of the BlueWater wind project has been delayed for two years, from 2014 to 2016

This IRP also evaluates three scenarios as compared to the Reference Case. These scenarios are:

1. Scenario Case # 1: additional 150 MW off-shore wind in 2016
2. Scenario Case # 2: additional 150 MW of on-shore wind in 2015
3. Scenario Case # 3: a 135 MW combined-cycle gas generation facility in southern Delaware.

Other areas of departure include

- the load forecast used in this analysis was prepared internally (See Appendix 3)
- the provision of a five year forecast of supply rates by customer class (See Appendix 8)
- stakeholder and public input, sought during a series of workshops in early 2010, prior to preparation of this IRP.
- the introduction of dynamic pricing as a demand response strategy

- an analysis using the latest PJM RTEP results. Thus, there are some changes in the PJM schedules for in-service dates for the major high-voltage transmission facilities which will affect electric energy delivery to Delaware. Specifically, due to the reduced PJM load forecast, PHI's Mid-Atlantic Power Pathway (MAPP) project now has an in-service date of 2015.

2. Summary Historical IRP Background

Pursuant to the Electric Utility Retail Customer Supply Act ("EURCSA"), which was enacted in 2006, Delmarva is required to prepare and file an Integrated Resource Plan ("IRP") every two years.[8] The IRP is designed to provide a comprehensive review of Delmarva's plans to procure energy for SOS customers for the next ten years after the filing.[9]

Delmarva filed its initial IRP under EURCSA on December 1, 2006. On January 23, 2007, the Commission issued Order 7122 which opened Docket No 07-20 for the Commission to perform its oversight and review of the IRP. By Order No 7263 dated August 21, 2007, the Commission opened Docket No 60 to consider the development of rules and regulations to govern Delmarva's preparation of an IRP.

On November 5, 2008, Delmarva filed the Third Update to the Integrated Resource Plan with the Delaware Public Service Commission under Docket No. 07-20. Significantly, the November 5, 2008 IRP included the then recently approved contract for up to 200 MW off-shore wind energy between Delmarva and Bluewater Wind as an integral part of the planned resource portfolio going forward. The resource portfolio also included Delmarva's approved contracts for up to 150 MW of land-based wind resources with AES and Synergics.

The first wind turbines began producing energy from the AES Armenia Mountain site in 2009 and the entire facility was declared in commercial operation in December 2009. In October 2008, the Commission had approved Delmarva's application to purchase up to 50 MW of land-based wind energy from this facility (Order No 7440). The timely implementation of this renewable energy project was the initial realization of Delmarva's plan to develop and acquire clean renewable generation resources for SOS customers.

[8] 26 *Del C.* §1007(c)(1).
[9] *Id*.

In March 2009, Babcock and Brown declared bankruptcy and announced plans to sell off assets. At the time, Babcock and Brown was the parent company of Bluewater Wind. In November 2009, Bluewater Wind was acquired by NRG.

In July 2009, the 145th General Assembly passed the Energy Conservation and Efficiency Act of 2009.[10] This Act set specific energy savings and demand reduction goals of 15% relative to 2007 levels by 2015. The Act also specified that the Delaware Sustainable Electric Utility (SEU) shall implement energy efficiency and conservation programs in collaboration with the utilities.

On August 18, 2009, prior to the start of evidentiary hearings in Docket No. 07-20, the Commission issued Order No. 7628 approving the proposed IRP Rules and Regulations (Docket No. 60) designed to govern the preparation of all future IRPs, including the 2010 IRP . The details of the IRP Rules and Regulations had been developed through a collaborative process among the parties including Delmarva, Commission Staff, the Delaware Public Advocate (DPA) and the Department of Natural Resources and Environmental Control (DNREC). The IRP rules approved by the Commission in Order No 7628 entail many new requirements, including more emphasis on transparency and environmental considerations.

At the time the IRP Rules were adopted by the Commission, the IRP that Delmarva had filed on November 5, 2008 had not yet been subject to evidentiary hearings. The parties jointly petitioned the Commission to cancel the evidentiary hearings, due to the fact that the November 5, 208 IRP had not been prepared with the benefit and guidance of the new Rules and Regulations. Further, as part of the motion, Delmarva agreed to prepare and file a new IRP consistent with the new Rules and Regulations by May 31, 2010. Delmarva further agreed to hold a series of informal workshops with the parties on specific IRP related issues and to schedule public meetings on the IRP throughout the State as part of the IRP process. On September 22, 2009 the Commission issued Order No 7661, which closed Docket 07-02 and directed Delmarva to file an IRP which complies with the rules set forth in Regulation Docket No. 60 no later than May 31, 2010. In advance of that May 2010 filing, workshops to discuss and review inputs to the next IRP and Public Comment Sessions were to be scheduled.

[10] 26 *Del. C.* §§1500-1507.

During October, November, and December of 2009, a number of informal workshops were held among the parties. The topics included Load Forecasting, Environmental Benefits and Externalities, Demand Side Management, and Scenario Development. Copies of the slide presentations made at these workshops can be found on Delmarva's website (http://www.delmarva.com/energy/renewable/de/irp.aspx). In addition, public meetings/comment sessions on the IRP were held in Wilmington, Georgetown, and Dover during January 2010.

In late January 2010, a significant change in the transmission plan for the PJM planning regions occurred that could have resulted in a large impact on high voltage transmission planning in Delaware. Specifically, Allegheny Energy and AEP (other large utility transmission owners within PJM) withdrew their application with PJM for construction of the PATH high voltage transmission line. The PATH project, if developed, would provide a transmission link from western PJM to the mid-Atlantic region of PJM and its delay or cancellation had the potential to significantly impact the long run PJM Regional Transmission Expansion Plan (RTEP) affecting Delaware. At that point, the next PJM RTEP was not expected until June 2010. Because the future expected state of the PJM transmission system is a key building block in preparing an IRP and a new RTEP incorporating the latest information, including the PATH project withdrawal, was not expected to be available until June 2010, there was a concern that the new PJM transmission plan, due out a month after the 2010 IRP was scheduled to be filed, might create an immediate need to update the IRP at considerable time and expense.

The parties convened another IRP workshop on February 23, 2010 and after considerable discussion with all parties, it was agreed that Delmarva would submit a motion to the Commission to delay the filing of the IRP until ninety days after the results of the RTEP became available. This action would allow Delmarva time to incorporate the latest RTEP information regarding the expected future state of the PJM transmission system into the 2010 IRP. If the RTEP information became available in June 2010 as anticipated, the expected date for the new IRP submittal would be October 1, 2010. The motion to amend the filing date was filed by Delmarva on March 11, 2010.

On March 30, 2010 the Commission issued Order No. 7755 which approved Delmarva's request for an extension of time to complete the IRP with the new RTEP results included. In this order the Commission noted their concern that the IRP filing not be delayed and indicated that in no case should the IRP be filed after October 31, 2010 without approval for good cause shown. Unfortunately, the relevant RTEP results were not made available by PJM until August 16, 2010, which is less than 90 days from October 31, 2010. Consequently, on September 1, 2010, Delmarva submitted a Motion to Amend Filing Date until November 15, 2010. On September 21, 2010 in Order No. 7845 the Commission approved Delmarva's Motion to Amend the Filing date of the 2010 IRP to November 15, 2010.

On July 28, 2010, Governor Markell signed a bill which expands Delaware's Renewable Portfolio Standards.[11] This bill requires Delmarva to obtain an amount of Renewable Energy Credits equal to 25% of eligible SOS load by 2025.[12] Also included in this bill was the establishment of an 11-member Renewable Energy Task Force to examine the current state of Delaware's renewable energy market and to make recommendations to the DNREC Secretary on the establishment of trading mechanisms and other structures to support the growth of renewable energy markets in Delaware. Delmarva is represented on the Task Force as well as on a subcommittee charged with making recommendations on solar REC market development.

In August 2010 Bluewater Wind requested a two year delay in the target date under its Power Purchase Agreement with Delmarva, from December 1 2014 to December 1, 2016, for delivering energy and RECs from its off-shore wind resource. In Order No. 7835 on September 7, 2010 the Commission approved an amended contract between Delmarva and Bluewater Wind incorporating the new in-service date.

On September 7, 2010, the Commission issued Order No. 7836 which approved a contract between Delmarva and White Oak Solar Energy to participate in a 10 MW thin-film solar energy park to be constructed on 103 acres in the 389 acre City of Dover owned Garrison Oak

[11] 26 *Del. C.* § 354 (a).
[12] *Id.*

Technology Park. The project is expected to be on line in the Summer of 2011. Delmarva will be acquiring 70% of the solar RECs generated by this project for 20 years.

On October 13, 2010, PJM, the regional high voltage transmission system coordinator reaffirmed the need for PHI's Mid Atlantic Power Pathway (MAPP) project with a new in-service date of 2015.

Delmarva began deploying Advanced Metering Infrastructure ("AMI") following the Commission's approval in Order No. 7420. AMI allows for (among other things) implementation of Dynamic Pricing. Following hearings in December 2009 and discussions in 2010, Delmarva and the Commission have agreed to a dynamic pricing working group session with the Commission in December 2010.

3. **Overview of IRP Analysis and Modeling Structure**

This Section of the IRP describes the overall analytical approach and major modeling tools used in the analysis. This is followed by six subsections describing in some detail key components of the IRP and Delmarva's energy procurement strategy. These subsections include discussions of the following:

- The Load Forecast
- Demand Side Management (DSM)
- Transmission
- Supply Resources
- Environmental Externalities
- Renewable Resources

IRP Analysis Approach

The intent of Delmarva's Integrated Resource Plan (IRP) is to provide Delmarva's customers and regulators with a road map of how the Company intends to procure electric energy for our Standard Offer Service (SOS) customers for the next ten years in a way that balances cost, price stability and environmental benefits. Delmarva's overall approach to developing the IRP's key resource alternatives is based upon the following general analytical approach:

1. Begin by preparing a detailed view of the future from 2011 – 2020 for an expected or "Reference" Case. The results of the Reference Case provide critical information along the key dimensions of price, price stability, and environmental benefits.
2. For scenario cases that represent relevant potential procurement policy alternatives to the Reference Case, create the same detailed level of information as was prepared for the Reference Case.[13]
3. Compare the 2011- 2020 results of the alternative procurement scenario cases with the Reference case along the key dimensions of price, price stability, and environmental benefits. For this IRP, three alternate scenarios were selected for comparative review and analysis:
    a. Scenario Case #1: Relative to the Reference Case, Delmarva procures an additional 150 Mw of offshore wind resources for SOS customers;

[13] The scenarios were discussed at the informal workshop of the parties held in December 2009

b. Scenario Case #2: Relative to the Reference Case, Delmarva procures an additional 150 MW of land based wind resources for SOS customers; and ,
c. Scenario Case #3: Relative to the Reference Case, Delmarva procures an additional 135 Mw of additional gas fired generation for SOS customers. The generation plant would be located in Southern Delaware.

4. Provide the Public Service Commission with the results of this comparison in a clear and concise manner for their consideration under the IRP Docket.

IRP Model Structure

In order to prepare a plan that meets the broad objectives of the IRP, it is necessary to use several separate but related planning models. The following narrative describes how the various planning tools included in the technical analysis are aligned to provide the information needed to determine a preferred energy procurement strategy, while meeting the Commission's approved IRP regulations.

The key planning tools that were used in developing this IRP were the following:

- The Integrated Planning Model (IPM®) developed by ICF. IPM® is a resource planning model that considers supply, demand and transmission resources. IPM® also provides information on power plant emissions.
- The Portfolio Model (PM) developed by the Brattle Group. This model is used to evaluate price stability of the Reference and Scenario cases.
- The Community Multi-scale Air Quality (CMAQ) and Benefits Mapping and Analysis Program (BenMAP) models developed by the US Environmental Protection Agency. These models are used to translate the change in emissions between the Reference Case and the individual scenario cases into quantified estimates of the effect on human health.
- The Time Matched Marginal Model (TMM) developed by Resource System Group (RSG). The TMM is used in preparing the environmental performance declarations supporting the life cycle analysis of the scenario cases relative to the Reference Case.

Each of these models performs specific tasks related to Delmarva's IRP requirements. The remainder of this section describes each of these models, their functions, capabilities and interrelationship with one another[14].

I. The IPM® model

The IPM® is the first analytical processor in the Delmarva IRP development chain. IPM® is a multi-regional generation planning and production cost model. For Delmarva's IRP, the model is focused on Delaware and PJM. The model provides a detailed look at the expected future state of generation resources over the planning period 2011 - 2020. The key inputs into IPM® include the load forecast, fuel costs, PJM RTEP approved transmission investments, energy efficiency programs and goals, demand reduction programs and targets, RPS requirements, and prevailing and expected environmental regulations.

In order to provide the picture of future generation markets for Delmarva's planning period of 2011 – 2020, the model comprehensively evaluates a large number of supply side and demand side resources to produce the least cost solution of existing and future generation resources. The evaluation produces a forecast of new generation facilities that will be economic, resources that will be retired, how much energy is produced by each available generation resource, what emissions are created by each generation resource, and expected capacity and energy prices.

The generation resources evaluated by IPM® include the following:

- Traditional fossil fueled generation
    - Gas fired combustion turbines
    - Gas fired combined cycle facilities
    - Traditional and super-critical coal fired facilities
    - IGCC
    - Oil fired facilities
- Nuclear generation
- Renewable resources

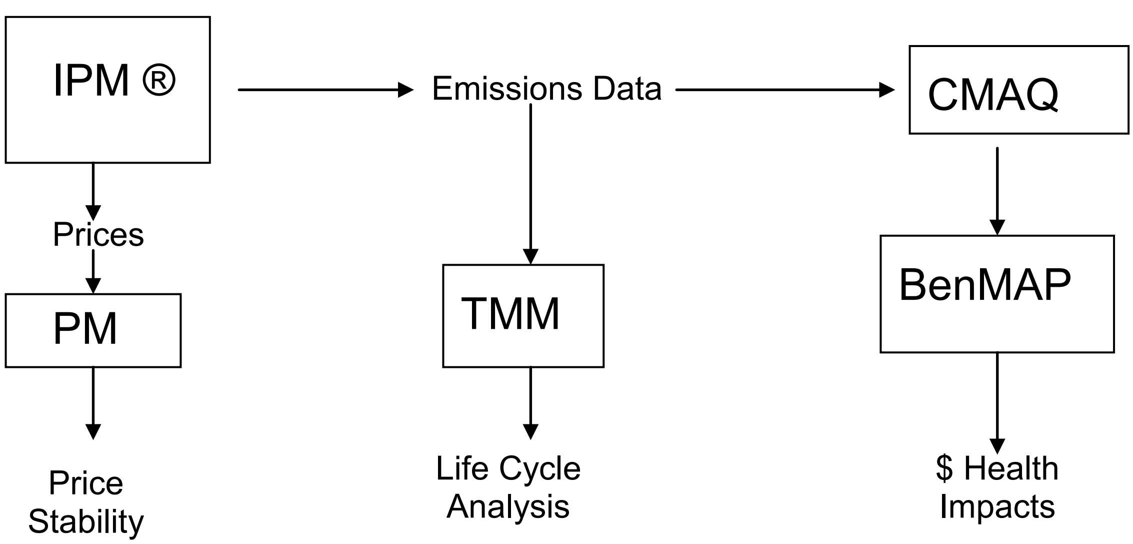
[14] A technical discussion of each model is provided in the Technical Appendices of this IRP. The Technical Appendices provide more detailed information around the mechanics of each model.

- Off-shore wind
- Land based wind
- Solar
- Biomass
- Land-fill gas.

A more detailed listing and specific information on the assumed cost and performance characteristics of these resources may be found in Technical Appendix 4.

The outputs of the IPM® provide key information for the other planning tools used in the IRP. The energy and price forecast are passed onto the Portfolio Model for an evaluation of price stability. Power plant emission data for criteria pollutants nitrous oxides (NOx), sulphur dioxide (SO_2), mercury (Hg) and carbon dioxide (CO_2) are passed on to the CMAQ and BenMAP models which are used in the evaluation of human health effects. The same emissions data are passed on to the Time Matched Marginal model used in performing the environmental life cycle analysis. A high level overview of this process is shown in Figure 1.

Figure 1



II. The Portfolio Model

The Portfolio Model (PM) is a stochastic model used primarily to evaluate the price stability of various planning options. The model is also used to perform risk analysis and review the sensitivity of the results to various planning assumptions. The PM relies on the output from the IPM® to obtain estimates of longer term energy and capacity prices. In the shorter term, the PM relies on market data from electric and gas markets to generate forward electricity price curves. In order to simulate electricity prices in future years, PM requires the additional input of current market price volatility information and the terms of the pricing related to Delmarva's purchase power agreements and Full Service Agreements.

Using the forward price information, hourly SOS customer load data, the contract price information and expected output of wind and solar resources, and forward price volatility, the PM uses Monte Carlo Techniques to simulate a range of future energy prices for SOS customers[15]. The price ranges produced by the PM analysis can be depicted by various percentage ranges.

In this IRP, the PM is used to evaluate the price and price stability characteristics of the Reference Case and the Scenario Cases. The PM is also used to evaluate various sensitivity cases around the Reference Case. The sensitivity analyses evaluate change in carbon prices and other factors. More detailed descriptions of the sensitivities analyzed by the Portfolio Model are provided in Appendix 5.

III. The CMAQ and BenMAP models

The CMAQ and BenMAP models are analytical tools used in the evaluation of the effect of power plant emissions on human health. Both CMAQ and BenMAP were developed by the US Environmental Protection Agency and are available in the public domain.

The CMAQ model takes the emissions data from the IPM® and along with detailed meteorological information, calculates expected changes to ambient air quality for the pollutants of interest. For this IRP, the CMAQ model performs these detailed calculations over a 4 Km grid covering most of the PJM footprint in the Mid-Atlantic States. This process is

[15] Amore detailed description of the Portfolio Model is provided in Technical Appendix 5.

computationally intensive and time consuming. BenMAP was then used to estimate the health impacts associated with the changes in air quality simulated by CMAQ.

IV. The Time Matched Marginal Model

The lifecycle analysis presented in the IRP uses the lifecycle assessment framework described in the draft ANSI SCS-002 standard. Part of this assessment used the Time Matched Marginal Model (TMM) to estimate the hour by hour impact of changes in the scenario cases against the Reference case. The TMM captures the impact of generation alternatives by specifically examining what happens to marginal air emissions on an hourly basis. A more detailed discussion of TMM and the entire lifecycle assessment framework is provided in Technical Appendix 7.

Section 3a – Load Forecast

Introduction

Delmarva's ten year energy procurement plan to provide the electrical requirements for SOS customers is based on an internally prepared load forecast covering the planning period through 2020. Section 4 of the IRP regulations provides detailed requirements for preparing a range of load forecasts as well a review of historical load data. A detailed documentation of Delmarva's load forecasts and its forecasting methods, intended to meet these requirements, is attached as Appendix 3.

A summary of the major forecast results is provided below.

Baseline Forecast

The following table summarizes the baseline forecast for summer peak demand (MW) and energy throughput (MWh) for 2011, the initial year of the IRP planning period, and 2020, the last year of the IRP planning period, for Delmarva Delaware's three major categories of customers (with street lights added as a fourth category for energy throughput).

The table also provides the summer peak demand and energy throughput for the SOS component of each category for the same two years.

Baseline Forecast – Peak Demand (MW) & Energy Throughput (MWh)

Delmarva Delaware Total & SOS - 2011 & 2020

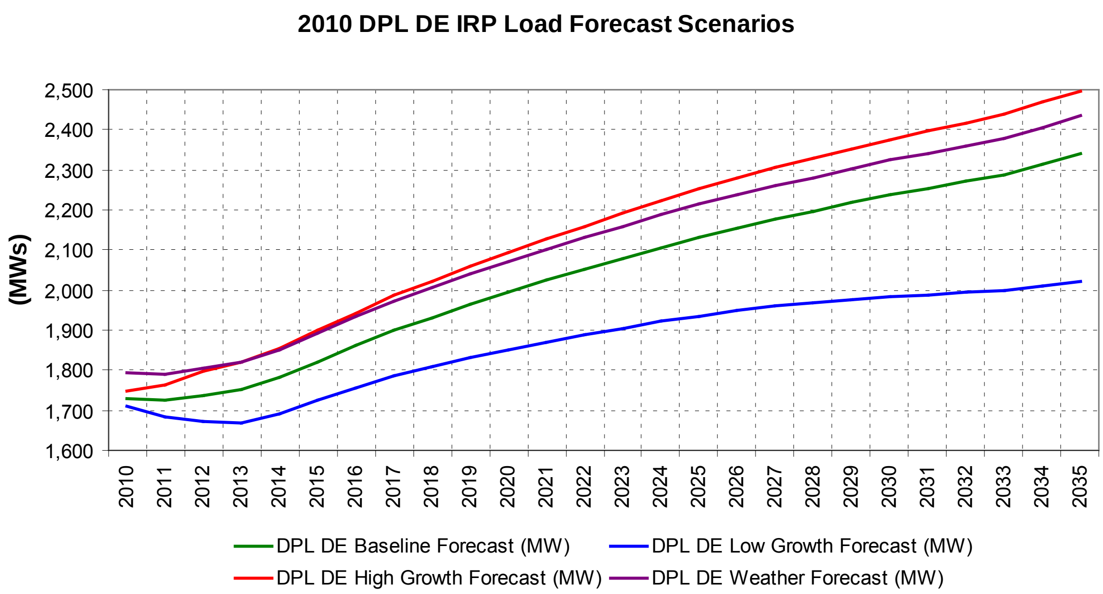
	2011 Delmarva Delaware		**2011 Delmarva Delaware SOS**		**2020 Delmarva Delaware**		**2020 Delmarva Delaware SOS**	
	MW	MWh	MW	MWh	MW	MWh	MW	MWh
Residential	859	2,987,883	834	2,900,947	994	3,411,773	979	3,312,503
Small Commercial	25	163,813	22	142,984	29	168,788	26	147,326
Large Commercial & Industrial	840	5,220,123	211	1,313,823	972	5,378,644	248	1,353,720
Street Lights	0	38,004	0	36,910	0	38,912	0	37,791

Total	1724	8,409,823	1067	4,394,664	1995	8,998,117	1253	4,851,341

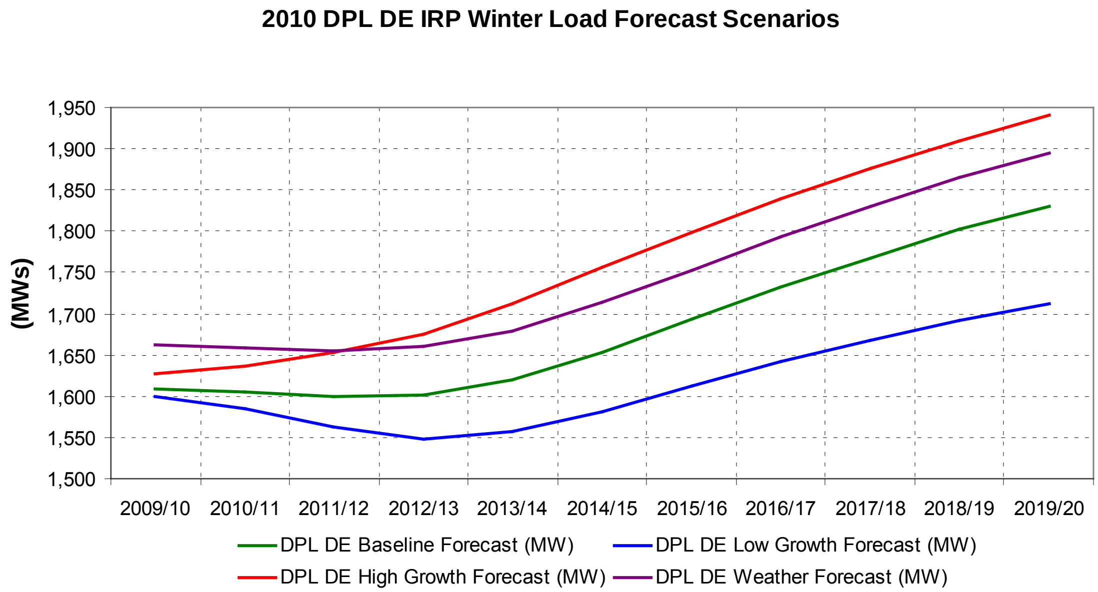
<u>Load Growth Scenarios</u>

In addition to providing a "baseline" forecast, the IRP regulations require Delmarva to prepare a range of load growth forecasts for a number of different assumptions. The following tables present, for differing assumptions, the Company's forecast for the unrestricted summer and winter peak demand, as well as the forecast for MWh , for all Delmarva Delaware customers over the ten year IRP planning period.

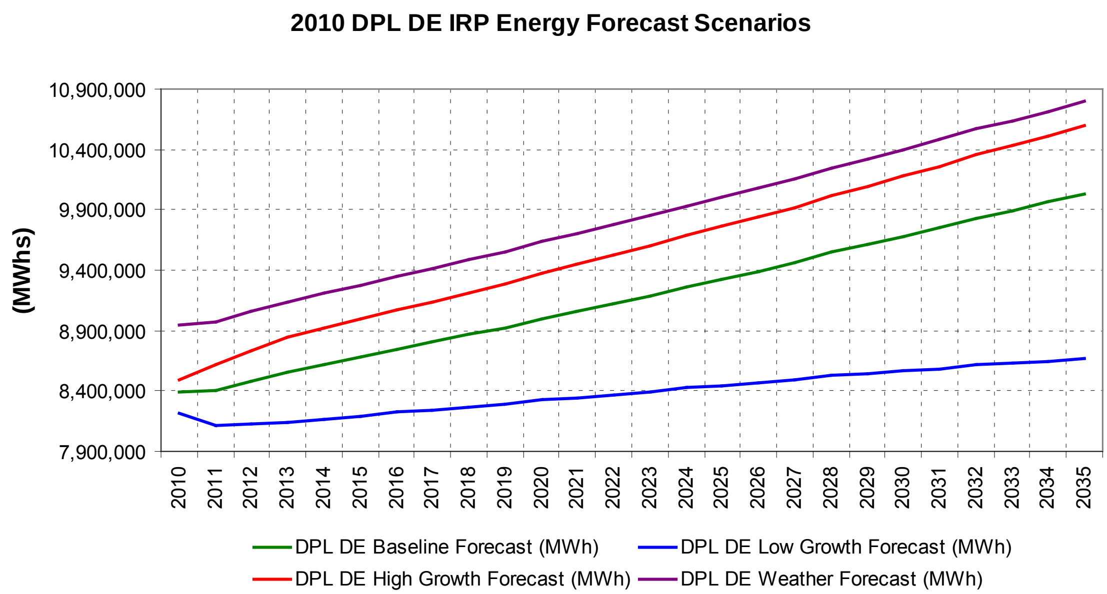
DPL Delaware Jurisdictional Summer Peak Demand (MWs)



DPL Delaware Jurisdictional Winter Peak Demand (MWs)



DPL DE Jurisdictional Energy Throughput
(MWhs)



In the tables above, the heavy green line represents the Baseline Scenario; it is assumed that 50% of the possible future outcomes will be above this forecast and 50% will be below. The red and blue lines represent, respectively, High and Low Economic growth Scenarios. It is assumed that 10% of the possible outcomes will lie above the High Economic Forecast and 10% will lie below the Low Economic forecast.

Finally, the purple line represents the Extreme Weather Scenario. This case is meant to reflect climate change potential for the region. Extreme Weather is represented by calculating the average and standard deviation of heating and cooling degree days for each month of the year. In the Extreme Weather Scenario, monthly heating and cooling degree days are set equal to their historical average plus two standard deviations.

IRP Requirements

Technical Appendix 3 includes a discussion of the methodology used in developing these forecasts and provides further information on these forecasts including:

- Historical data and future estimates of:
    - Five year historical loads, current year-end estimate and 10 year weather adjusted forecast
    - DPL – DE and DPL DE SOS load forecasts aggregated and by customer category, including capacity (MW) and energy (MWh) data
- Winter and summer peak demand for total DPL DE load and DPL DE SOS load by customer class
- Weather adjustments including consideration of climate change potential
- A description of the process used to develop the forecast, probability of occurrence and how well the model predicted past load data for five years.

SOS Reference Portfolio Forecast

The Baseline Forecast described above does not include the effects of future DSM programs. For purposes of procuring a portfolio to provide SOS customer energy requirements, the expected energy savings from DSM programs needs to be subtracted from the Baseline Forecast of SOS customer energy to arrive at the amount of annual energy expected to be procured for SOS customers in the Reference Case. The Reference Portfolio Forecast represents the expected

Delaware jurisdictional SOS load for which Delmarva is obligated to make contractual arrangements for energy supply.

The Reference Portfolio Forecast is obtained by subtracting the DSM savings (adjusted for losses) attributable to SOS customers resulting from the energy efficiency and demand response programs offered by both the SEU and Delmarva from the total Delmarva DE SOS customer load. In addition the hourly SOS customer load is also subtracted since the hourly SOS customers are not part of the Full Requirements Service contracts used to supply all other SOS loads.

The following table summarizes, for the first (2011), midpoint (2015) and end (2020) years of the planning period, the calculation for the reference portfolio load.

SOS Reference Portfolio Forecast GWH

	2011	**2015**	**2020**
DPL DE SOS - GWh	4,395	4,606	4,851
Hourly SOS - GWh	(264)	(267)	(272)
DSM for non-hourly SOS - GWh	(87)	(646)	(928)
SOS Reference Portfolio - GWh	**4,044**	**3,693**	**3,651**

3b - DEMAND SIDE MANAGEMENT ANALYSIS

The Delmarva Power IRP evaluates Demand Side Management ("DSM") programs as potential resource options for meeting Delmarva Power Delaware customer energy and capacity requirements. In contrast to supply side options such as new generating units, DSM options reflect potential savings in either the total consumption of electrical energy, reduction of system demand during peak periods or both. Demand Side Resources were examined to support energy efficiency, conservation, and demand response in compliance with the recently enacted Delaware Energy Conservation & Efficiency Act of 2009.

Since the last Delmarva Power IRP was filed, the State of Delaware has enacted the Delaware Energy Conservation & Efficiency Act of 2009 ("The Act")[16] designating energy efficiency as the first energy supply resource to be considered before any increase or expansion of traditional energy supplies. The Act creates an Energy Efficiency Resource Standard ("EERS") and requires that each Affected Electric Energy Provider[17] must achieve at a minimum "Energy Savings that is equivalent to 2% of the Provider's 2007 electricity consumption, and a coincident peak demand reduction that is equivalent to 2% of the Provider's 2007 peak demand by 2011, with both of the foregoing increasing from 2% to 15% by 2015."[18] Prior to the existence of this statutory requirement, the Delaware Legislature created the Delaware Sustainable Energy Utility ("SEU") to coordinate and promote the sustainable use of energy in Delaware. The SEU is responsible for implementing energy efficiency and conservation programs in Delaware. The Act requires that Delmarva Power attain the demand and energy reduction goals in coordination with the SEU and the Delaware Weatherization Assistance

[16] 26 *Del. C.* §§1500-1507.
[17] An "Affected Electric Energy Provider" is defined as an electric distribution company, rural electric cooperative, or municipal electric company serving Energy Customers in Delaware. 26 *Del. C.* §1501(1).
[18] *Id*. at 1502(a)(1).

Program ("WAP"). Delmarva Power is required to submit a report annually to the State Energy Coordinator which demonstrates that the achieved cumulative Energy Savings[19] in the previous calendar year are at least equal to the energy savings required by these regulations.

Additionally, on August 18, 2009 the Commission promulgated new rules[20] governing the preparation of future IRPs stating that this and all subsequent IRPs shall include:

> "a detailed description of energy efficiency activities in accordance with 26 *Del. C.* §1020."

26 *Del. C.* § 1020 states:

> "IRPs filed with the Commission pursuant to §1007 of this Chapter shall include a detailed description of energy efficiency activities. Electricity demand response programs shall be directly implemented by the utility. Demand-side management and other energy efficiency activities shall be implemented by the SEU (as defined in §8059 of Title 29), in collaboration with the utility. The contributions of the utility-implemented and SEU-implemented programs shall be considered in meeting the Energy Efficiency Resource Standards required under Chapter 15 of this Title".

Delmarva Power has also examined and included an analysis of the likely energy and demand reductions that will result from code and standard improvements in projecting the total attainable demand and energy consumption savings.

Also, § 1504 (a)3.b. of the Act states that the procedures and standards for defining and measuring savings that can be counted towards the Energy Savings targets shall at a minimum: "enable that energy consumption and peak estimates in the applicable base and current years be adjusted as appropriate, to account for the changes in weather, population, previously enacted and deployed demand side management and energy efficiency programs by the Provider since the 2007 base year, or other variables."

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[19] "Energy Savings" means (i) reduction in electricity consumption, (ii) reduction in natural gas consumption, (iii) electricity coincident peak demand response capability, or (iv) equivalent energy efficiency measures, in Delaware from a base year of 2007, calculated on a calendar year basis. 26 *Del. C.* §1501 (20).

[20] In the Matter of the Investigation Into the Adoption of Proposed Rules and Regulations to Accomplish Integrated Resource Planning for the Provision of Standard Offer Service by Delmarva Power & Light Company under 26 *DEL. C.* § 1007(c) & (d) (Opened August 7, 2007). PSC Regulation Docket No. 60.

In accordance with these requirements Delmarva Power calculated its electric consumption base year target by determining 2% and 15% of the weather normalized annual consumption for 2007 and then subtracted those figures from the forecasted consumption for years 2011 and 2015, respectively. A straight line ramp up between 2011 and 2015 was assumed to be the target for the interim years of 2012, 2013, and 2014.[21]

For example:

Table B.1

2007 DPL DE Peak Weather-Normalized Load and Energy Consumption

Year	DPL DE WN Peak Demand (MW)	DPL DE WN Consumption (MWh)
2007	1,832	8,727,112
2011 Goal 2%	37	174,542
2012 Goal 5%	84	465,030
2013 Goal 7%	132	751,281
2014 Goal 11%	198	1,037,045
2015 Goal 15%	275	1,309,067

Peak is the WN unrestricted load coincident with PJM peak
Consumption is WN calendar MWh sales

At this time the Act does not address what the consumption reduction requirements will be after 2015. In the absence of a clear directive, Delmarva has assumed that the goal for each successive year after 2015 would be to continue calculating the goal as 15% of the 2007 consumption minus each following year's otherwise forecasted consumption.

Similarly, the calculation of the peak demand base year target was accomplished by determining 2% and 15% of the weather normalized annual non-coincident peak load for 2007 and then subtracting that number from the forecast demand for years 2011 and 2015. A straight line ramp up between 2011 and 2015 was used to project the target for those interim years. From

[21] Delmarva Power consulted with the SEU on the interpretation of the statutory goals.

2016 and beyond, the goal calculation will continue to be 15% of the 2007 peak demand minus each following year's otherwise forecasted demand.

The resulting projected reductions for Delmarva Delaware as required by The Act are shown in Table B.2 below.

Table B.2[22]

Delmarva Power DE Reduction Goals

Delmarva Power DE Reductions Goals				
Year	DPL DE WN Peak Demand Goals (MW)	Cumulative MW Reduction for that Year	DPL DE WN Consumption Goals (MWh)	Cumulative MWh Reduction for that Year
2011	1,784	37	8,235,281	174,542
2012	1,749	84	8,018,296	465,030
2013	1,715	132	7,801,311	751,281
2014	1,681	198	7,584,326	1,037,045
2015	1,647	275	7,367,340	1,309,067

Overall DSM Cumulative Impacts

The cumulative impacts from each of the Delmarva Power and SEU DSM initiatives for the 2011 – 2020 period is shown numerically in Tables B.3 and B.4 and graphically for the 2011 – 2020 period in Charts B.3.1 and B.4.1

Table B.3
Reference Case Energy Savings Estimates

[22] Source data: 2010 DPL DE IRP Forecast BASELINE with NCP 100218

Reference Case Projected Delmarva Cumulative DSM Energy Impacts (MWh)										
DSM Initiative	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
AMI Enabled Dynamic Pricing	1,279	35,826	36,304	34,721	33,225	33,464	33,866	34,243	34,640	35,057
Distribution Efficiency Improvements	4,131	8,262	12,392	16,523	20,654	24,785	28,916	33,047	37,177	41,308
Transmission Efficiency Improvements	244	485	5,614	5,855	6,096	6,342	6,594	6,850	7,110	7,374
Combined Heat & Power	61,503	95,335	129,167	162,999	196,831	251,191	305,552	359,912	414,272	468,633
Street Lighting Improvements	34	67	101	134	134	134	134	134	134	134
Delaware Weatherization Assistance Program	885	1,769	2,654	3,539	4,424	5,308	6,193	7,078	7,962	8,847
Residential Direct Load Control	3,546	6,183	8,905	10,215	11,562	12,956	13,966	14,977	15,988	17,000
Non-Residential Direct Load Control	0	102	732	1,260	1,289	1,316	1,345	1,367	1,391	1,412
Improved Codes and Standards	36,795	73,591	110,386	147,181	183,977	220,772	257,567	294,363	331,158	367,953
DSEU Approved Residential EE	19,992	38,411	55,398	71,082	85,580	99,000	111,439	114,251	117,044	119,819
DSEU Approved C/I EE	34,190	71,545	112,383	157,051	205,933	259,450	315,516	374,259	435,812	500,316
DSEU Approved Community Residential EE	0	17,019	34,038	51,057	68,076	82,967	97,859	110,623	123,387	134,024
DSEU Approved Community C/I EE	0	17,019	34,038	51,057	68,076	82,967	97,859	110,623	123,387	134,024
DSEU Prospective Residential EE	1,457	11,870	24,437	37,060	47,259	47,259	47,259	47,259	47,259	47,259
DSEU Prospective C/I EE	10,488	87,547	184,734	287,312	375,952	375,952	375,952	375,952	375,952	375,952
Total Cumulative Energy Impact (MWh)	**174,542**	**465,030**	**751,281**	**1,037,045**	**1,309,067**	**1,503,865**	**1,700,016**	**1,884,936**	**2,072,674**	**2,259,112**
Cumulative Energy Goal Achievement	**100%**	**100%**	**100%**	**100%**	**100%**	**115%**	**130%**	**144%**	**158%**	**173%**

Chart B.3.1
Reference Case Energy Savings by Identified Initiative

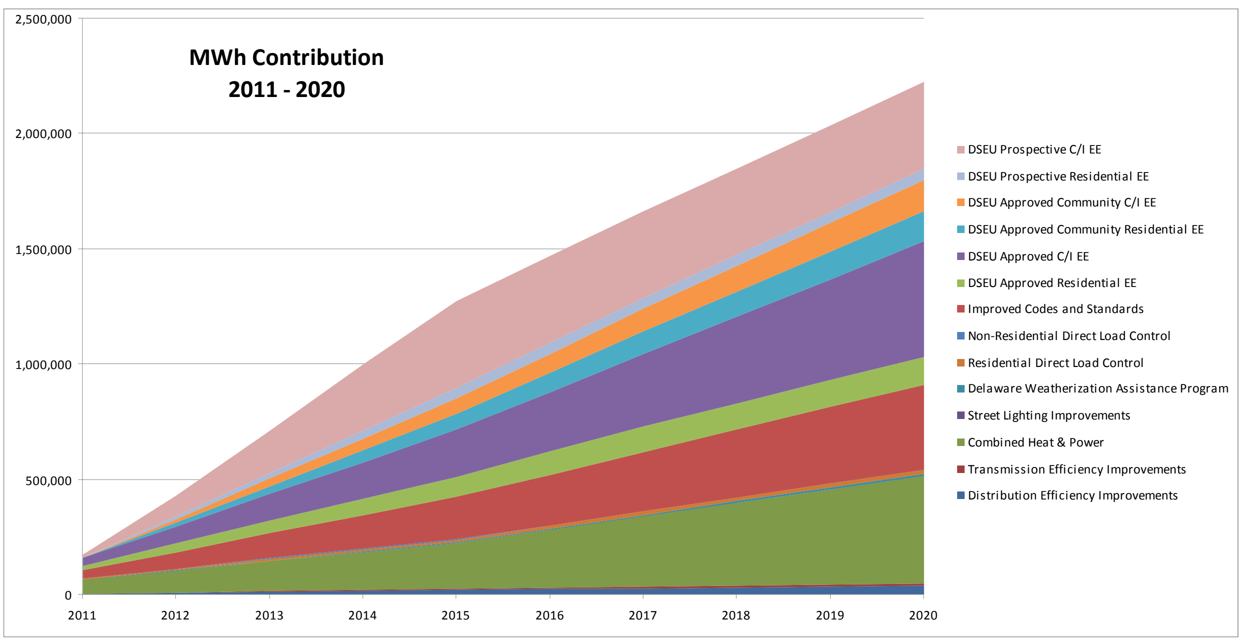
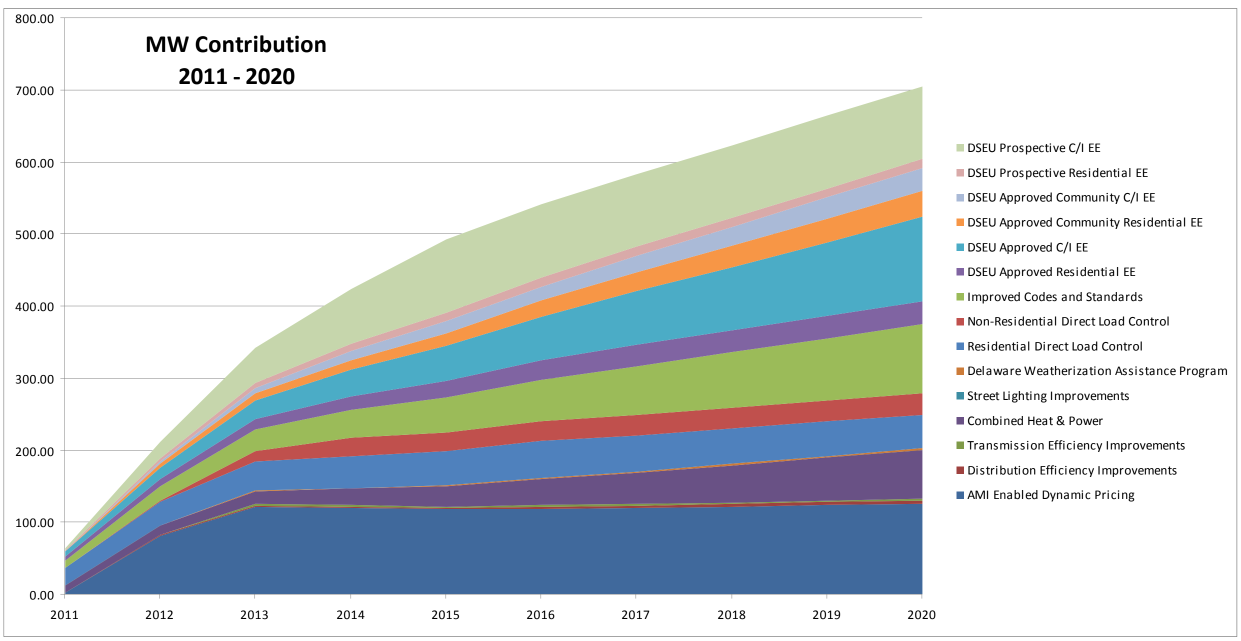


Table B.4
Reference Case Demand Savings Estimates

Reference Case Projected Delmarva Cumulative DSM Demand Impacts (MW)										
DSM Initiative	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
AMI Enabled Dynamic Pricing	2.89	81.55	122.41	120.51	118.33	119.57	120.27	122.23	124.27	126.41
Distribution Efficiency Improvements	0.47	0.94	1.41	1.89	2.36	2.83	3.30	3.77	4.24	4.72
Transmission Efficiency Improvements	0.07	0.14	1.63	1.70	1.77	1.84	1.91	1.98	2.06	2.14
Combined Heat & Power	8.78	13.63	18.47	23.32	28.16	36.06	43.96	51.85	59.75	67.65
Street Lighting Improvements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delaware Weatherization Assistance Program	0.24	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37
Residential Direct Load Control	25.41	31.85	40.09	43.15	46.98	51.78	50.40	49.04	47.69	46.34
Non-Residential Direct Load Control	0.00	2.12	15.24	26.25	26.84	27.43	28.02	28.48	28.99	29.42
Improved Codes and Standards	9.63	19.25	28.88	38.51	48.14	57.76	67.39	77.02	86.65	96.27
DSEU Approved Residential EE	5.37	10.31	14.87	19.08	22.97	26.57	29.91	30.67	31.42	32.16
DSEU Approved C/I EE	8.02	16.78	26.35	36.83	48.29	60.84	73.99	87.76	102.20	117.33
DSEU Approved Community Residential EE	0.00	4.57	9.14	13.71	18.27	22.27	26.27	29.69	33.12	35.98
DSEU Approved Community C/I EE	0.00	3.99	7.98	11.97	15.96	19.46	22.95	25.94	28.93	31.43
DSEU Prospective Residential EE	0.39	3.19	6.56	9.95	12.69	12.69	12.69	12.69	12.69	12.69
DSEU Prospective C/I EE	2.82	23.50	49.59	77.12	100.92	100.92	100.92	100.92	100.92	100.92
Total Cumulative Demand Impact (MW)	**64.1**	**212.3**	**343.3**	**424.9**	**492.9**	**541.4**	**583.6**	**623.9**	**665.1**	**705.8**
Cumulative Demand Goal Achievement	**175%**	**253%**	**261%**	**215%**	**179%**	**197%**	**212%**	**227%**	**242%**	**257%**

Chart B.4.1
Reference Case Demand Savings Estimates



ENERGY EFFICIENCY and CONSERVATION –

The Delaware Sustainable Energy Utility

At this time, the SEU has developed and implemented a portfolio of energy efficiency and conservation ("EE&C") programs. Programs include residential, commercial/industrial, and public sector markets across a wide range of end use measures. Delmarva Power has used these programs to project future energy efficiency impacts. The SEU, at Delmarva Power's request, provided information to enable the Company to project potential energy efficiency impacts over the 10-year planning period of the IRP. Although the SEU must implement programs that address efficiency in electricity, natural gas, and other fuels throughout the State, the impacts in the Company's IRP include only electricity savings estimates within the Delmarva Power service territory. In past IRPs, Delmarva Power employed an energy efficiency impacts evaluation process which involved the analysis of potential individual efficiency measures where each measure was evaluated for cost-effectiveness using the Total Resource Cost Test ("TRC"). This process required energy and demand impacts for cost-effective measures to be calculated. This was conducted as part of a more traditional IRP process where the screening assesses the economic performance of measures through standard cost-benefit tests with the intent to select the most economically efficient and cost-effective portfolio since utility ratepayer funds would be used to implement the programs. At this time, the SEU is responsible for determining:

1. which energy savings measures will be targeted, and
2. the screening criteria used to select measures and programs.

The SEU program selection process is not constrained by the traditional utility cost-effectiveness screening process for several reasons:

1. The SEU's programs do not currently use ratepayer funds, and therefore have no direct impact on rates.

2. The SEU expects to move away from direct rebates and towards financing and performance contracting over time. TRC and other conventional cost-benefit tests typically assume that rebates are the primary method to encourage participation.
3. Since the SEU's programs include electricity, natural gas and other fuels, screening is based more on insuring the availability of programs for all market segments and fuels so that all energy sources are addressed and the limitations of federal stimulus funding are avoided.

SEU Responsibility

The SEU is responsible for the EE&C programs in Delaware. As discussed above, the SEU is moving towards self-sustaining financing rather than direct incentives or subsidized financing. Therefore the relevant performance criteria evaluated by the SEU[23] includes:

1) Compliance with program technical requirements;

2) Eligibility of participants and measures in compliance with ARRA and other requirements;

3) Underwriting criteria and overall credit quality and risk in the portfolio;

4) Reserve requirements and losses;

5) Matching loan terms to the life of the proposed measures; and

6) Recovery of operating costs.

Currently/Recently Offered SEU Programs

[23] The SEU is responsible for determining the criteria for selecting energy efficiency and conservation measures and programs.

The SEU offers programs in all market sectors. All of the current programs have relied upon federal stimulus funding except for the Performance Contracting Program which will use tax-exempt bonds and other private sources.

The existing or recently offered SEU Programs[24] are:

1. ENERGY STAR® Residential Appliance Rebate Program – Offered Delaware residents up to $200 on certain ENERGY STAR® qualified clothes washers, dishwashers, room air conditioners, or gas water heaters. Rebates were supported in part by funds from the American Reinvestment and Recovery Act. This program was terminated as planned on August 31, 2010.

2. Efficiency Plus Homes – Offers money saving rebates on:
   a. Efficient Home Lighting Program – Discounts on ENERGY STAR ® compact fluorescent light bulbs at participating retailers.
   b. ENERGY STAR ® qualified Heating and Cooling Rebate Program – Offers rebates up to $550 on energy efficient heating and cooling equipment.
   c. Home Performance with ENERGY STAR ® (existing homes) - Offers comprehensive home energy audits and retrofits with incentives up to $8,250 on HVAC, weatherization and other measures.
   d. Green for Green Program (new construction) – Offers incentives from $3,000 to $6,000 for those taking on new home construction projects that meet high efficiency standards.

3. Efficiency Plus Program for Business – Offers prescriptive and custom equipment incentives and financing:

[24] The SEU has provided this descriptive information to Delmarva Power for inclusion in this IRP.

a. Prescriptive Measures - Includes a variety of equipment types that have been identified for pre-set incentives in existing buildings based on certain performance specifications. All applicants must complete a program application and specific worksheet(s) for the prescriptive measures selected. If financing is provided, an energy audit will be required.

b. Custom Measures - Equipment not offered as a prescriptive measure or for new construction projects. The proposed equipment must be identified in an application with potential measure savings and equipment life information. If financing is provided, an energy audit will be required.

4. Efficiency Plus Program for Institutions and Non-Profits – Offers prescriptive and custom equipment incentives and financing.

a. Prescriptive Measures - Includes a variety of equipment types that have been identified for pre-set incentives in existing buildings based on certain performance specifications. All applicants must complete a program application and specific worksheet(s) for the prescriptive measures selected. If financing is provided, an energy audit will be required.

b. Custom Measures – This allows customers to apply for equipment not offered as a prescriptive measure or for new construction projects. The proposed equipment must be identified in an application with potential measure savings and equipment life information. If financing is provided, an energy audit will be required.

5. Low Income Multi-Family Housing Loan Program – This Program is currently receiving applications. The program offers low interest financing for the energy-

related components of new construction and renovation of low income multi-family housing projects. Eligible projects must qualify for tax credits under the Delaware State Housing Authority's competitive Low Income Housing Tax Credit program. Financing will be provided for improved building envelope measures, high efficiency HVAC and water heating equipment.

6. Performance Contracting for Institutions and Non-Profits – Directed at schools, universities, municipalities, hospitals, and other large institutional energy users. The program provides a comprehensive approach to assess energy use and to implement energy and water efficiency improvement projects by providing contractual and financing mechanisms to execute the upgrades with minimal financial risk. Financing for this program will utilize tax-exempt bonds and other private financing sources. No federal stimulus funds are used in this program. This program uses long-term utility cost savings derived from implementation of the projects to fund the improvements. Energy Services Contractors ("ESCOs") execute the Performance Contracting Program, offering guaranteed energy savings which cover annual payments for project costs, usually over a contract term of 10-15 years. The SEU has selected eleven area ESCOs to deploy the program.

Potential Future SEU Programs

For planning purposes, there are prospective programs which are in varying stages of program design. One of the main differences between current and prospective programs is funding. Prospective residential, commercial and industrial programs will utilize other private sources for financing as federal stimulus funds are spent or committed for financing.

1. Expanded Residential Home Retrofits – Expansion of the Home Performance with ENERGY STAR ®. Customers will be eligible for low-interest financing from the SEU. Many of the recommendations are expected to provide sufficient bill savings (from energy bills) to cover the cost of the improvements over the life of the loan. Expanded program participation based on the availability of additional funding for financing and marketing.
2. Expanded Commercial / Industrial Energy Efficiency Programs – Expansion of current Efficiency Plus for Business Program. Customers are eligible for low-interest financing from the SEU for pre-approved measures and custom measures meeting program criteria for payback. Many of the recommendations will provide enough bill savings (from energy bills) to cover the cost of the improvement over the life of the loan.
3. Sustainable Communities Program – This program is prospective only at this time. Intended to be a community-level development effort (as compared to individual participants) – a neighborhood, group of businesses, participants in a geographic area, etc. who would propose to the SEU to install energy efficiency measures and distributed renewables. The program is expected to be divided into two markets segments:
   - Large C&I Energy Efficiency Program – Will promote energy efficiency and distributed renewables in the private large commercial and industrial sectors using a performance contracting approach.

– Residential, Commercial, Industrial Efficiency Program – Will help to promote energy efficiency and distributed renewables in the residential sector (at a minimum) and possibly extending to other sectors.

4. Combined Heat and Power Program – This program is prospective only at the time, and there is no program design. The SEU and/or Delmarva will identify and help to promote and/or finance CHP project opportunities.

SEU Program Energy Impacts

The currently projected energy impacts of the SEU current and potential future programs are shown in table B.5.[25]

[25] Program energy and demand reduction targets have been developed to attain the legislatively established targets. Original SEU projected savings have been scaled downward so that the overall targets are met for the IRP reference case, but not exceeded. Savings estimates were developed by the SEU based upon known information as of May 2010. Because actually achieved reductions will be dependent on a variety of unknown factors, Delmarva Power has performed an IRP DSM sensitivity analysis reflecting load reduction achievements that are 50 percent below the statutorily mandated reduction levels.

Table B.5

Projected SEU Cumulative Program Impacts

Projected SEU Cumulative Program Impacts										
	Annual Savings (MWh)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Residential Programs										
Approved (see note 2)										
Residential Home Retrofits	1,080	2,160	3,240	4,320	5,400	6,480	7,560	8,640	9,720	10,800
Energy Star Appliance Rebate Program	525	1,025	1,501	1,955	2,387	2,798	3,190	3,563	3,918	4,257
Multi-family Housing Loan Program	1,191	2,381	3,572	4,762	5,953	7,143	8,334	9,524	10,715	11,905
Residential Lighting Program	16,000	30,546	43,769	55,790	66,718	76,653	85,684	85,684	85,684	85,684
Prospective (see note 3)										
Expanded Residential Home Retrofits	1,457	11,870	24,437	37,060	47,259	47,259	47,259	47,259	47,259	47,259
Residential Energy Impact (see note 4)	**20,252**	**47,981**	**76,518**	**103,886**	**127,716**	**140,333**	**152,027**	**154,670**	**157,296**	**159,905**
Commercial/Industrial Programs										
Approved (see note 2)										
Performance Contracting	29,762	62,500	98,512	138,125	181,699	229,631	279,960	332,805	388,292	446,553
SEU C&I Efficiency Loan Programs	2,381	4,762	7,143	9,524	11,905	14,286	16,667	19,048	21,429	23,810
Prospective (see note 3)										
Expanded C&I Efficiency Programs	10,488	87,547	184,734	287,312	375,952	375,952	375,952	375,952	375,952	375,952
C&I Energy Impact (see note 4)	**42,630**	**154,809**	**290,389**	**434,961**	**569,556**	**619,869**	**672,579**	**727,804**	**785,673**	**846,315**
Sustainable Communities										
Approved (see note 2)										
Large C&I Energy Efficiency (PES)	0	16,000	32,000	48,000	64,000	78,000	92,000	104,000	116,000	126,000
Residential, Commercial, Industrial Efficiency (SES)	0	16,000	32,000	48,000	64,000	78,000	92,000	104,000	116,000	126,000
Sustainable Communities Energy Impact	**0**	**32,000**	**64,000**	**96,000**	**128,000**	**156,000**	**184,000**	**208,000**	**232,000**	**252,000**
All Programs										
Total Annual Program Savings	**62,883**	**234,791**	**430,907**	**634,847**	**825,273**	**916,202**	**1,008,605**	**1,090,475**	**1,174,969**	**1,258,220**
Transmission and Distribution Loss Savings (6% of annual participant savings)	**3,773**	**14,087**	**25,854**	**38,091**	**49,516**	**54,972**	**60,516**	**65,428**	**70,498**	**75,493**
Total Energy Impact	**66,656**	**248,878**	**456,761**	**672,938**	**874,789**	**971,174**	**1,069,122**	**1,155,903**	**1,245,467**	**1,333,713**

Notes

Note 1: This table was derived from a forcast of estimated savings required to meet EERS compliance scenario 2. This does not reflect a specific plan under development by the SEU. Delmarva Power worked with the SEU to identify energy efficiency and conservation programmatic savings opportunities to achieve the Delaware legislative reduction goals. These projections serve as the basis for the IRP DSM reference case.

Note 2: The Board has approved and launched programs in this category, or has given preliminary approval pending final approval of program design.

Note 3: The Board has reviewed several proposals and will approve programs after further consultation with the Contract Administrator.

Note 4: Any inconsistancies in summing of subtotals are due to rounding

The Delaware Weatherization Assistance Program ("WAP")

WAP installs energy efficiency improvements in low-income households. Specifically, WAP provides for the installation of such measures as: air sealing, insulation, window and door replacement, and furnace repair and replacement. Based on an analysis prepared several years ago on electrically-heated homes by the University of Delaware's Center for Energy and Environmental Policy, WAP estimates kWh savings of 22% on average per household. In program year 2009 (4/1/09 – 3/31/10) the program served a total of 1,221 homes statewide. WAP plans to serve approximately 1,100 homes during each program year going forward.[26]

Combined Heat and Power Potential

The Act states that there shall be established requirements to include procedures for counting combined heat and power savings towards the energy and demand savings goals.[27] Delmarva Power conducted a separate study of Combined Heat and Power ("CHP") potential in the Delmarva service territory of Delaware. (See Attachment 1 to Exhibit B titled "Combined Heat and Power Market Assessment for Delmarva Power, May 2010, prepared by ICF International.")

CHP offers a potentially efficient and clean approach to generating electricity or mechanical power and supplying useful thermal energy from a single fuel source at the point of use. Instead of purchasing electricity and also burning fuel in an on-site furnace or boiler to produce thermal energy, an industrial or commercial facility can use CHP to provide these energy services in one energy-efficient step. As a result, CHP can provide significant energy

[26] Information provided by Ken Davis, Manager, Weatherization Assistance Program.
[27] It is not clear at this time whether the SEU will be pursuing implementation of a CHP program. In the even that the SEU chooses not to do so, Delmarva Power may propose a plan for approval by the Public Service Commission to design and implement a CHP program.

efficiency and environmental advantages over separate heat and power supplies. CHP systems are located at or near end-users, and therefore lessen or defer the need to construct new transmission and distribution (T&D) infrastructure. While the traditional method of producing separate heat and power has a typical combined efficiency of 45 percent, new CHP systems can operate at efficiency levels as high as 80 percent. CHP's high efficiency results in less fuel use and lower levels of greenhouse gases emissions.

To estimate the potential for CHP in Delmarva's Delaware service territory, Delmarva Power used the *ICF CHP Market Model.* This model estimates cumulative CHP market penetration as a function of competing CHP system specifications, current and future energy prices, and electric and thermal load characteristics for target markets. The CHP analysis included the following four steps:

- Estimate CHP Technical Market Potential – An estimate of the technically suitable CHP applications by size and by industry. This estimate was derived from the screening of customer data based on application and size characteristics that were used to estimate groups of facilities with appropriate electric and thermal load characteristics conducive to CHP.

- CHP Technology Characterization – For each market size range, a set of applicable CHP technologies were selected for evaluation. These technologies were characterized in terms of their capital cost, heat rate, non-fuel operating and maintenance costs, and available thermal energy for process use on-site

- Estimate of Energy Price Projections – Present and future fuel and electricity prices were estimated to provide inputs into the CHP net cost calculation.

- Estimate of CHP Market Penetration – Within each customer size, the competition among applicable CHP technologies was evaluated. Based on this competition, the economic market potential was estimated and shared among competing CHP technologies. The rate of market penetration by technology was then estimated using a market diffusion model.

CHP Market Penetration Results

CHP market penetration was analyzed for two alternative sets of input assumptions:

- Base Case – existing federal incentives for CHP with no assumed supplemental SEU or utility provided incentives.
- Incentive Case – a 20% reduction in the capital cost was assumed in addition to existing federal tax credits.

The resulting difference between these two cases provides the estimated energy and peak demand grid savings.

CHP Base Case (what would be expected without additional incentives)

The Base Case results are shown Table B.6. The output measures shown are as follows:

- Economic Potential – the capacity (MW) of CHP for which the CHP payback meets the economic acceptance criteria.
- Cumulative Market Penetration – This represents the additional installed CHP capacity. The cumulative market penetration is a subset of the economic potential representing the economic capacity that has penetrated the market up to that point. Not all economic

capacity enters the market at once. However, by the end of the forecast period, the cumulative market penetration approaches the economic potential.

- Avoided cooling represents the electric air conditioning capacity that is avoided due to CHP systems with thermally activated cooling (absorption chillers).
- Potential Number of Systems – This represents the range of CHP systems that would be installed to meet the capacity shown in the cumulative market penetration rows.
- Annual Electric Energy (MWh) – represents the annual energy output of the installed CHP units.
- Incremental Onsite Fuel -- represents the net increase in annual natural gas consumption or the fuel required for the CHP prime movers minus the boiler fuel avoided by using the CHP thermal energy.
- Cumulative Investment – represents the net capital cost of the equipment after incentives. In the base case there are no utility or state incentives, however, continuing availability of federal tax credits is assumed.
- Cumulative Incentive Payments – represents the SEU or utility incentives to the CHP customers. Again, in the base case there are no such incentives; in the incentive case this represents 20% of the CHP capital costs before incentives.

There are also a number of calculated unit measures including:

- The average capital cost equal to the net capital investment divided by the CHP cumulative electric generation capacity, and the average incentive value on the same basis. The sum of the capital cost and the incentive equal the total average unit capital cost for CHP.

- The incentive was modeled as a capital cost reduction. This capital cost incentive is converted to an equivalent annual operating cost to show what that would be if the incentive were provided in that form. This does not represent an additional incentive, only an alternative valuation regarding the equivalency of a capital cost incentive compared to an operating cost incentive.
- The average electric and gas costs.
- The average net heat rate shows the efficiency of the CHP systems after the avoided boiler fuel is subtracted from the fuel required to operate the CHP system.

Table B.6

Market Penetration Results for Base Case (without any additional incentives)

CHP Measurement	2010	2015	2020	2025
Economic Potential, MW	36.5	39.5	57.7	85.8
Cumulative Market Penetration (MW)				
Industrial	1.1	8.0	18.8	24.8
Commercial/Institutional	1.0	7.6	20.0	30.7
Total	2.1	15.6	38.9	55.4
Avoided Cooling	0.1	1.0	2.4	3.6
Scenario Grand Total	2.3	16.6	41.2	59.1
Potential Number of Systems	1 - 3	2 - 5	4 - 10	6 - 14
Annual Electric Energy (MWh)				
Industrial	8,246	58,150	135,609	178,037
Commercial/Institutional	7,195	53,828	141,513	216,786
Total	15,442	111,978	277,122	394,823
Avoided Cooling	527	3,457	7,415	10,545
Scenario Grand Total	15,969	115,436	284,537	405,368
Incremental Onsite Fuel (billion Btu/year)				
Industrial	47.9	333.1	762.6	1000.6
Commercial/Institutional	55.2	399.2	1005.2	1525.7
Total	103.1	732.3	1767.8	2526.3
Cumulative Investment (million 2010 $)	3.2	23.2	57.1	82.1
Cumulative Incentive Payments (Million 2010 $)	0.0	0.0	0.0	0.0
Annual Electric Energy (Million 2010 $)				
Industrial	0.6	4.5	10.9	15.0
Commercial/Institutional	0.7	5.2	14.1	22.3
Total	1.3	9.8	25.0	37.2
Avoided Cooling	0.1	0.4	0.6	0.3
Scenario Grand Total	1.4	10.2	25.6	37.5
Incremental Onsite Fuel (million 2010 $)				
Industrial	0.3	2.2	5.2	7.1
Commercial/Institutional	0.3	2.6	6.8	10.9
Total	0.7	4.7	12.0	18.1

CHP Incentive Case – 20% Capital Cost Reduction

An incentive scenario representing a 20% capital cost reduction for CHP was evaluated to measure the increase in market penetration. This is a potential incentive program that Delmarva Power or the SEU could establish to increase the adoption of CHP in its service territory. The gas and electric pricing and all other assumptions are the same as the *Base Case* assumptions.

Table B.7

Market Penetration Results for 20% Capital Cost Reduction Incentive

CHP Measurement	2010	2015	2020	2025
Economic Potential, MW	58.7	62.9	85.7	114.5
Cumulative Market Penetration (MW)				
Industrial	2.0	13.5	29.8	37.9
Commercial/Institutional	1.5	11.6	30.3	44.3
Total	3.5	25.0	60.1	82.2
Avoided Cooling	0.2	1.4	3.5	5.2
Scenario Grand Total	3.7	26.5	63.6	87.4
Potential Number of Systems	1 - 3	3 - 7	6 - 12	9 - 16
Annual Electric Energy (MWh)				
Industrial	14,355	97,643	214,566	272,983
Commercial/Institutional	10,922	82,447	215,048	313,921
Total	25,278	180,089	429,614	586,904
Avoided Cooling	736	4,958	10,962	15,163
Scenario Grand Total	26,014	185,047	440,576	602,068
Incremental Onsite Fuel (billion Btu/year)				
Industrial	82.7	556.6	1204.8	1534.0
Commercial/Institutional	81.9	601.0	1515.3	2203.2
Total	164.6	1157.6	2720.1	3737.2
Cumulative Investment (million 2010 $)	4.1	29.0	69.6	96.5
Cumulative Incentive Payments (Million 2010 $)	1.1	8.1	19.2	25.9
Annual Electric Energy (Million 2010 $)				
Industrial	1.1	7.4	16.9	22.5
Commercial/Institutional	1.0	7.9	21.0	31.6
Total	2.1	15.3	37.9	54.2
Avoided Cooling	0.1	0.6	0.9	0.4
Scenario Grand Total	2.2	15.9	38.8	54.6
Incremental Onsite Fuel (million 2010 $)				
Industrial	0.5	3.6	8.1	11.0
Commercial/Institutional	0.5	3.9	10.3	15.8
Total	1.0	7.5	18.4	26.7

In the Base Case (what would be expected without incentives), the projected CHP market penetration in the next five years is 16.6 MW out of an economic potential of 39.5 MW. Addition of the 20% capital cost reduction incentive increases the five year market penetration to 26.5 MW out of an economic potential of 62.9 MW. By 2025, the cumulative market penetration in the Base Case is 59.1 MW. The 20% capital cost reduction is estimated to increase this market penetration by 28.4 MW to a total of 87.4 MW – a 48% increase in the market size.

Demand Response Programs

Delmarva Power is responsible for implementing demand response programs within its service territory, although additional demand savings will result from the SEU's energy efficiency and conservation programs and all other energy savings sources with the exception of street lighting improvements. Consequently, Delmarva Power has developed demand response potential projections for all customer market segments for Delmarva Power Delaware. The projected programs have been designed specifically to participate in available demand response market opportunities within the PJM capacity and energy markets.[28] Participation in these markets provides a potential revenue stream to offset a portion of program costs, provides PJM dispatchers demand response programs that can be used to help maintain system reliability during high load periods, and helps to mitigate high regional electricity market capacity and energy prices. The programs can also be used by Delmarva Power to help manage localized distribution system problems depending upon their location and scale. Demand response programs help to defer the need to construct additional generation resources, transmission facilities, and distribution facilities. The programs can also assist with the integration of renewable generation sources, such as wind power, due to its uncertain availability during periods of high electricity demand. Finally the programs offer consumers a direct method of reducing their monthly electricity bills through both various incentives for participating in each program and the reduction of energy consumption during specific periods of time.

Delmarva Power's specific projected programs include:

- A residential air conditioner direct load control program consisting of a choice of smart thermostats or outdoor switches.

[28] PJM market demand response rules are evolving and therefore existing rules will change over time. Delmarva Power participates in the PJM stakeholder process related to these market rule changes.

- A small commercial customer packaged air conditioner direct load control program consisting of a choice of smart thermostats or outdoor switches.
- AMI enabled dynamic pricing for customers served under standard offer service that provides an incentive to reduce electricity use during announced critical event periods.

Table B.8 contains the results of Delmarva Power's cost-effectiveness screening for the Company's planned direct load control program. Both programs are expected to be very cost-effective under the Total Resource Cost Test, with benefit/cost ratios exceeding six to one.

Table B.8
Direct Load Control Cost Effectiveness Results

Load Control Cost Effectiveness			
	Benefits ($Million)	Costs ($Million)	TRC
Residential Load Control	$ 73.7	$ 10.8	6.8
Non-Residential Load Control	$ 66.8	$ 2.6	25.4

AMI enabled dynamic pricing was originally justified through the AMI business case that was filed with the Delaware Public Service Commission on August 29, 2007. Deployment of an AMI System was authorized by the Delaware Public Service Commission in Order No. 7420 in Docket 07-28. Delmarva has been developing Dynamic Pricing programs and intends to file its Dynamic Pricing program application in the first quarter of 2011. Delmarva anticipates that the Commission will establish a procedural process to determine the final form of any AMI enabled dynamic pricing program. Delmarva Power has encouraged alternate electricity suppliers to develop their own forms of AMI enabled dynamic electricity prices.

Residential Direct Load Control

The planned Residential Direct Load Control Program is a voluntary customer program designed to update, expand, and over time, replace the legacy Energy For Tomorrow central air conditioning/heat pump load control program with newer technology. The new program will provide a voluntary and simple method for residential consumers with central air conditioning or heat pump systems to automatically reduce peak electricity demand during peak usage periods and to also reduce their overall air conditioning and heating system energy consumption. The program will accomplish this goal through the choice of the installation of remotely controllable smart thermostats or direct load control switches capable of reducing the air conditioner load on the electric system after receipt of a Delmarva Power command signal.[29] The smart thermostats will be capable of being programmed to automatically vary temperature settings, thereby providing added energy savings opportunities. The planned program will be integrated with Delmarva Power's planned AMI system. This will permit the Company to rely upon the two-way communication capability of the AMI System and to directly support AMI enabled dynamic pricing options for customers who elect to participate. As shown in Table B.15 available peak demand reduction capability for the Residential Direct Load control is projected to be 47 MW by the 2015 summer. Associated energy savings are estimates to exceed 11,500 MWh by year-end 2015.

Non-Residential Direct Load Control

The primary objective of the voluntary Non-Residential Load Control Program is to provide a simple method for non-residential consumers with central air conditioning or heat pump systems to automatically reduce peak electricity demand during peak usage periods and to also reduce their overall electricity consumption. The program will accomplish this goal through the installation of remotely controllable smart thermostats or other direct load control equipment

[29] Customers will have a choice of either a smart thermostat or an outdoor cycling unit.

capable of reducing the air conditioner's load on the electric system after receipt of a Delmarva Power command signal and capable of being programmed to automatically vary temperature settings.[30] Available peak demand reduction impacts for the Non-Residential Direct Load control are projected to be 26.8 MW by 2015. Projected energy savings are estimated to exceed 1,200 MWh annually by year-end 2015. These savings estimates are included within Table B.15 in the non-residential program figures.

Peak Demand Reductions from AMI-Enabled Dynamic Pricing

The Company will seek Delaware Commission approval of:

1) AMI enabled dynamic pricing energy supply rates for customers served under Standard Offer Service rates;

2) Delmarva Power's proposed design and applicability of its dynamic pricing tariffs;

3) Delmarva Power's proposed phase-in timeline for implementing dynamic pricing; and,

4) the accompanying AMI enabled dynamic pricing customer education plan.

A significant benefit of Delmarva Power's AMI System is that it makes possible widespread implementation of voluntary dynamic pricing structures for Standard Offer Service Delmarva Power customers, which in turn is expected to provide significant peak load reductions on the Delmarva Power system.[31] Competitive generation suppliers are encouraged to offer their own forms of innovative dynamic pricing as well.

AMI-enabled dynamic pricing encourages demand response through pricing options that more closely track wholesale electricity market supply conditions compared with conventional rate structures. There are numerous dynamic pricing options which promote demand response, such as hourly pricing, critical peak pricing, and critical peak load reduction rebates. These rate

[30] Customers will have a choice of smart thermostats or direct load control cycling equipment.
[31] The Company anticipates that it will complete the installation of the majority of AMI meters for its Delaware customers by year-end 2010.

structures can be designed to track either day-ahead or real-time PJM Delmarva Power Zonal Locational Marginal Prices for energy.

The rate options proposed in the Dynamic Pricing Plan filed on May 5, 2010, are expected to reduce electricity demand during high energy priced periods. Customers who actively participate in the program will receive financial benefits by reducing their electricity use during periods of high prices; help the Company to achieve the demand reduction goals established by The Act; help to mitigate wholesale electric energy and capacity prices within the region; defer the need to construct additional generation, transmission, and distribution facilities; and assist with maintaining the reliability of electricity supply during periods of electricity supply constraints.

The availability of AMI enabled detailed energy use information to Delmarva Power's electricity customers is expected to assist customers in reducing their annual consumption. These resulting energy reductions are one component of the Company's efforts to achieve the energy reduction goals established through The Act. The Company has projected residential annual energy savings of 1.5 percent, as described in more detail below.

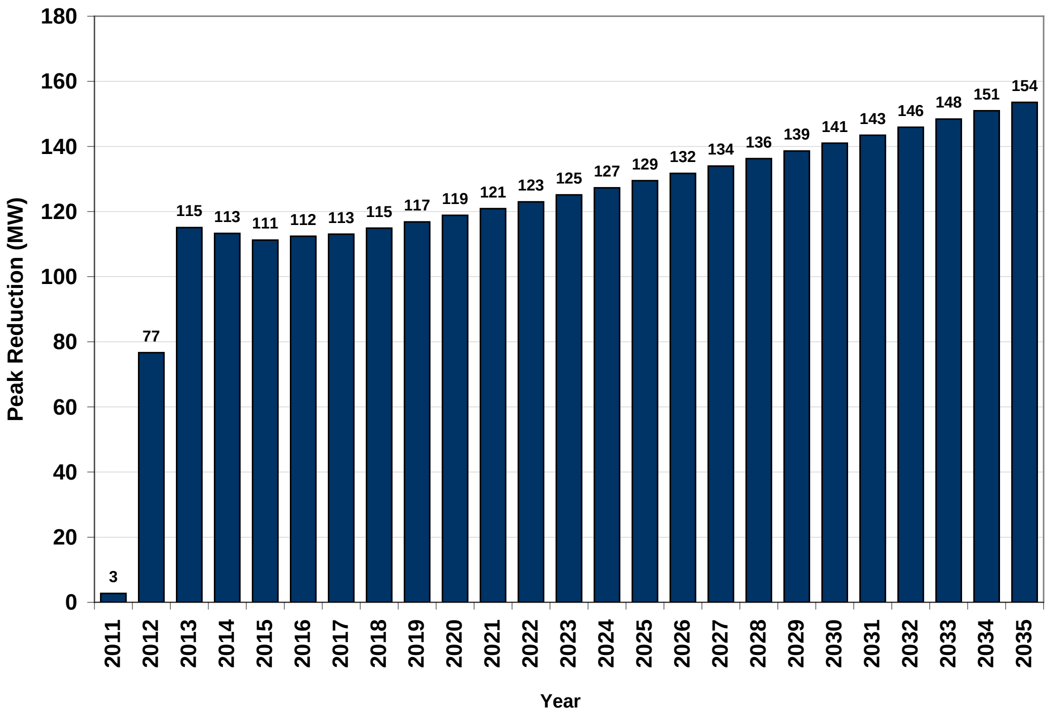
Delmarva Power's proposed Dynamic Pricing Program will be comprised of two separate dynamic pricing offerings. These are designated the Critical Peak Pricing ("CPP") option and the Critical Peak Rebate ("CPR") option. Both the CPP and CPR options are designed to give customers strong incentives to reduce consumption during the times when the costs of producing and supplying electricity are the highest.

Delmarva Power and the Brattle Group have performed a detailed study of the projected energy and demand savings attributable to dynamic pricing in the Company's Delaware service territory based upon load reduction impacts from available comparable industry studies – the ongoing Baltimore Gas & Electric Company's ("BGE") dynamic pricing pilot, and the California statewide pricing pilot. The residential impacts of dynamic pricing programs in Delaware were estimated by adapting the Pricing Impact Simulation Model (PRISM) developed through the California smart meter pilot studies to the price elasticities that were estimated through the BGE study. Non-residential customer price elasticities were based upon results from the comprehensive California dynamic pricing pilots. All pricing estimates were adjusted for Delaware load shapes and weather conditions.

The dynamic pricing impact study excluded the load impacts of Delmarva Power's existing and planned direct load control program, the projected energy efficiency and conservation savings expected to be achieved by the SEU, and energy and demand savings from other identified sources. These adjustments lessen the estimated demand savings that will be achieved by dynamic pricing programs; therefore, if reductions from other sources are not achieved, demand reductions from dynamic pricing would be expected to be higher.

The dynamic pricing deployment scenario for Delaware was analyzed based upon the Company's proposed implementation of the program. It was assumed that customers are defaulted to a CPR rate structure, as proposed in the filing. Over time, some customers leave the rate for their existing flat rate. Other customers leave the rate for the CPP rate structure. Some customers reduce loads aggressively in response to price while other customers will respond less aggressively. By 2025, Delmarva Power estimates that 55 percent of SOS residential customers will be served on a CPR rate, 20 percent on a CPP rate, and 25 percent will not be enrolled in a dynamic rate. Of the eligible SOS non-residential customers, 65 percent will be enrolled in CPR, 10 percent enrolled in CPP, and 25 percent will not be enrolled in a dynamic pricing rate. The estimated demand response is shown below. Dynamic pricing is expected to achieve a reduction in peak demand of 129 MW in Delaware by the year 2025, shown in Table B.9.[32]

Table B.9
Projected System Peak Reductions



The Company will provide additional detailed energy use information in all customer bills and provide detailed savings recommendations through its existing internet information site for customers, Delmarva Power's "My Account" portal. Delmarva Power has estimated that residential customers will reduce their energy consumption by 1.5 percent annually due to the availability of detailed energy use information to Delmarva Power customers. An estimate of 1.5 percent for residential conservation savings is quite conservative.[33]

Transmission and Distribution Efficiency Improvements

[32] Table B.9 represents the timing of dynamic pricing implementation as it existed at the time inputs to the IPM modeling were developed during May, 2010.
[33] See also a paper by Ahmad Faruqui, Sanem Sergici, and Ahmed Sharif, "Impact of Informational Feedback on Energy Consumption – A Survey of the Experimental Evidence", *Energy: The International Journal*, April 2010.

The Act defines Energy Efficiency to include "the reduction in transmission and distribution losses associated with the design and operation of the electrical system."

Transmission Loss Reductions

PJM has the responsibility for planning and operating the transmission system and, as part of that responsibility, PJM conducts an annual detailed forward look to be certain that the transmission system that is required to supply future load growth meets the established reliability criteria. This annual review is known as PJM Regional Transmission Expansion Process (RTEP). The RTEP identifies the need for new transmission facilities or upgrades to existing transmission facilities, including transmission facilities directly affecting Delmarva. Besides increasing the reliability of the transmission system, these system upgrades have the added benefit of reducing system losses. This is accomplished because adding new facilities or upgrading existing facilities in many cases reduces the impedance of the system and allows the transmission system to function more efficiently, meaning that more of the power generated or imported is used to serve the distribution system rather than being required to supply transmission line and transformer losses.

In order to determine what these savings would be, Delmarva Power compared the 2007 Delmarva Power Zone transmission topology with the topology that is expected to exist in 2015 with all of the transmission upgrades required between 2007 and 2015. These added upgrades are expected to reduce the transmission system losses by 0.2%; this translates to an approximate savings of 20,254 MWh on an annual basis in the Delmarva Power Zone. The transmission system additions and upgrades that are presently part of the PJM Regional Transmission Expansion Plan for the period 2007 to 2015 are shown in Table B.10 below.

The reduction in transmission losses from Year 2011 through 2020 for Delmarva Power Delaware electric customers are expected to be 2.14 MW's and 7,374 MWh over that time period. The savings through Year 2020 may be higher if the PJM RTEP process shows the need to reinforce the system through additional transmission upgrades. The PJM RTEP results have only being fully evaluated through the 2014/2015 study years. These studies are re-evaluated every year which may adjust the future plans accordingly.

Table B.10
Reduction in Transmission Losses Due to System Upgrades from Year 2011 – 2015

Reduction in Transmission Losses Due to System Upgrades from Year 2011 - 2015										
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
MW	0.07	0.07	1.49	0.07	0.07	0.07	0.07	0.07	0.08	0.08
MWh	244	241	5129	241	241	246	252	256	260	264

Notes:
1. The MW value represents the savings in transmission losses for Delmarva (Delaware customers only)
2. The MWHr numbers were calculated based on loading factors from the FERC Form 1 "Energy Sales"
3. The data past Year 2015 was based on Demand growth for MW and Energy growth for MWHr

Table B.11
List of Projects in the 2015 Case

Upgrade ID#	Project Description (New Bus Numbers)	In-Service Date
B0241.3	Red Lion 500/230kV Work	5/31/2009
B0261	Red Lion/Reybold Replace Disc. Switch (231126-231128)	5/31/2009
B0494.1	New Red Lion 138kV Sub (231127), (tap line 231121-231128)	5/31/2009
	Red Lion 230/138kV 2nd Auto (231004-231127)	
B0262	Christiana/Edgemoor (231112-231109)	5/31/2009
B0389	Indian River 138/69kV AT-1/AT-2 Replacement (232121-232258)	5/31/2009
B0414	Christiana/New Castle (231112-231118)	5/31/2009
B0295	N. Seaford/Pine Street (232246-232824)	5/31/2009
	Pine Street/Dupont-Seaford (232824-232247)	
B0316	Laurel/Mumford (232249-232826)	5/31/2009
B0291	Harmony/Edgemoor (231002-231001)	5/31/2009
B0483	Church 138/69kV (232100-232203 ckt.2)	5/31/2009
B0320	Harbeson/Lank (232251-232831)	12/31/2009
B0483.2	Wattsville 138kV bus (New Bus # 232133)	5/31/2010
	Wattsville 138/69kV (232133-232281)	5/31/2010
B0483.1	Oak Hall/Wattsville (232132-232133)	5/31/2010

B0263	Indian River/Frankford Replace Term. Equip. (232121-232123)	5/31/2010
B0320	New Cool Springs 230kV Sub (232001), (tap line 232006-232004)	5/31/2010
	New Cool Springs 69kV Sub (232269), (tap line 232251-232831)	
	Cool Springs 230/69kV Xfmr (232001-232269)	
B0484	Worcester/Berlin (232267-232266)	5/31/2010
B0485	N.Seaford/Taylor (232246-232825)	5/31/2010
B0527	Bethany 69kV 2-staged Cap Bank (230908) (replace existing cap bank)	6/1/2010
B0528	Bethany T1 Replacement with 138/12kV Xfmr - Move (232261-232627) to (232122-232627)	6/1/2010
B0529	Grasonville 69kV Cap Bank (additional stage @ 232207)	6/1/2010
B0530	Wye Mills 69kV 2 staged Cap Bank (230902) (replace existing cap bank)	6/1/2010
B0531	Wye Mills 138kV Conversion (4 breaker ring bus) Wye Mills 138/69kV Xfmr AT2 (232101-232206 ckt.2)	6/1/2010
B0567	Mt. Pleasant/Middletown (232104-232106)	6/1/2010
	Middletown/Townsend (232106-232107)	
B0568	3rd Indian River 230/138kV Xfmr (232006-232121 ckt. 3)	6/1/2011
B0272.1	Keeney-Rock Springs (10-51)	5/31/2012
B0566	Trappe Tap/Trappe Tap Alt (232232-232230)	6/1/2012
	Trappe Tap Alt/Talbot (232230-232820)	
	Talbot/Tanyard (232820-232821)	
	Tanyard/Preston (232821-232233)	
	Preston/Todd (232233-232234)	
B0480	Lank/Five Points (232831-232253)	5/31/2012
B0513	Maridel/Ocean Bay (232263-232262, 6723-1)	6/1/2012
B0752	Reybold/Lums (231128-231129)	5/31/2013
B0754	Glasgow/Mt. Pleasant Rebuild (231124-232104)	5/31/2013
B0750	New Loretto "LOR_230" 230kV (New Bus # 232008)	5/31/2013
	Vienna/Loretto (232005-232008), (new line)	
	Piney Grove/Loretto (232007-232008), (new line)	
	Loretto 230/138kV Xfmr (232008-232127), (new)	
	Remove Loretto/Vienna 138kV (232127-232117)	
	Remove Loretto/Piney Grove 138kV (232127-232128)	
B0725	3rd Steele 230/138kV Xfmr (232000-232103 Ckt. 3)	6/1/2013
B0751	Additional Breakers @ Keeney	6/1/2013
B0733	2nd 230/138kV Xfmr @ Harmony (231002-231114 Ckt. 2)	6/1/2013
B0732	Vaughan/Wells 69kV Rebuild (232813-232815)	6/1/2013
B0737	Indian River/Bishop 138kV (232121-232125), (new line)	6/1/2013
B0792	Reconfigure Cecil 230kV and 138kV Ring Bus	6/1/2013
	Cecil 230/138kV Xfmr (231007-231130), (new)	
	Cecil 34kV Normally Open (231415-231416)	
B0873	2nd Glasgow - Mt. Pleasant 138kV (231124-232104 Ckt. 2)	6/1/2013
B0876	138th Street 50 MVAR SVC	6/1/2013
B0874	Brandywine Sub Reconfiguration	6/1/2013
B0753	2nd 230/138kV Xfmr @ Loretto (232008-232127 Ckt.2)	6/1/2014

B0877	2nd Steele - Vienna 230kV (232000-232005 Ckt. 2)	6/1/2014
B****	Church/Wye Mills 138kV (232100-232101), (new line)	6/1/2015

Capacitor Control Program

Delmarva Power plans to implement a new Distribution VAR Dispatch (DVD) System that will have two-way communication with capacitors being controlled by a centralized computer system integrated with EMS (Energy Management System) and will include local voltage override on each bank in the event that communication is lost.

The concept and equipment for this program was selected as part of the PHI Blueprint for the Future initiative. This system will also have the capability to remotely operate capacitor banks by the System Operators should a situation arise. Current plans are to install Cooper controllers on capacitor banks tied together with two-way communication via the installed Silver Spring AMI Network and having a centralized control algorithm integrated with the EMS. The DVD System will have the capability to maintain unity power factor at the substation and on the individual distribution feeders. Implementation of this system is expected to begin in year 2013 and will result in a savings of approximately 82,900 MWh annually when fully implemented in the State of Delaware for Delmarva Power customers.

Energy Savings from Higher Efficiency Transformers Compared to Industry Minimum Efficiency Levels

Electric distribution transformers are evaluated consistently throughout the PHI utility companies using the minimum efficiency tables contained in NEMA TP1-2002, Section 4. As the Department of Energy ("DOE") issued their Final Ruling in 2007 to establish more stringent minimum efficiency levels, Delmarva Power was already investigating methods to increase the minimum efficiency levels, beginning with increasing the minimum efficiency to the DOE's unapproved TSL-2 level for 2008 purchases. Consistent with moving forward with this effort, Delmarva Power is now evaluating transformers utilizing the Total Owning Cost ("TOC") Methodology as specified in NEMA TP1-2002, Section 2.

Near the end of 2009, Delmarva Power, through its parent, PHI, awarded a multi-year contract for the purchase of liquid immersed distribution transformers to several manufacturers based on the TOC Methodology for evaluating transformers. In order to meet the DOE recently-implemented (January 2010) high efficiency levels, some transformer manufacturers chose to quote their bids using amorphous metal steel for core construction in their units.

Amorphous Metal ("AM") is a unique alloy structured of atoms that occur in random patterns. Conventional grain oriented steel (silicon steel) has an organized crystalline structure with much higher resistance to magnetization, which leads to higher core losses. AM is a metallic alloy with no crystalline structure due to the use of Boron in the alloy. Lower losses in AM transformers are a direct result of the lower loss in the base material. The absence of the crystalline structure leads to lower hysteresis losses in the core, and the higher resistivity and lower thickness of the metal leads to lower eddy current losses in the core. This results in total losses for AM at about one third of those found in silicon steel transformers.

At Delmarva Power, one transformer manufacturer was awarded the contract to supply both single and three phase padmount transformers and will be supplying AM units. Other manufacturers chose to supply silicon steel transformers built to the new DOE efficiency levels. The successful manufacturer for single phase pole type transformers will be supplying all but eight stock numbers use silicon steel for core construction. The remaining eight will be constructed with AM. These three types of transformers, the pole-type and both padmount-types, account for the vast majority of the transformers to be used in Delaware.

As both AM units and higher efficiency silicon steel units are delivered, they will be used in new construction after existing inventories are depleted. Manufacturers and utilities alike recognize the high potential to save energy by installing low loss transformers for new construction. In addition, as older transformers are removed due to damage or failure, they will also be replaced with these higher efficiency units. Even higher energy savings can be realized by replacing old high loss transformers with new low loss designs, including both amorphous and DOE efficiency units.

The below Table B.12 indicates the expected annual average demand, in kilowatts, due to the reduction in losses of new higher efficiency transformers when compared to the DOE minimum efficiency levels implemented January 1, 2010, for manufacturers to adhere to when designing and constructing distribution transformers. The table also indicates the expected annual energy savings due to the use of AM and silicon steel transformers when purchased using the TOC methodology as compared to the DOE minimum efficiency levels. Since the DOE minimum efficiency levels are the current standard in the industry effective 2010, Delmarva Power would achieve this energy savings as these units are installed.

Table B.12
Average Demand & Energy Savings Over Industry Minimum Efficiency

Average Demand & Energy Savings Over Industry Minimum Efficiency

Transformer Type & Core Construction	Estimated Annual Quantities (Units)	Total Aggregate Nameplate KVA	Expected Annual Avg. Demand over DOE (kW)	Expected Annual Energy Savings (MWh)
1-Phase Pad Amorphous	813	53,307	181	1,587
3-Phase Pad Amorphous	129	53,875	164	1,433
1-Phase Pole Amorphous	875	29,025	97	851
1-Phase Pole Silicon Steel	576	33,168	30	260
Total	2,393	169,375	472	4,131

Table B.13 below indicates both the cumulative annual average demand (in kW) and the cumulative annual energy savings (in MWh) that will be realized through the purchase of higher efficiency transformers as a result of evaluating using the Total Owning Cost Methodology of NEMA TP1-2002, Section 2.

Table B.13
Cumulative Expected Annual Energy Savings from Transformer Purchases by TOC Methodology

Cumulative Expected Annual Energy Savings from Transformer Purchases by TOC Methodology

Higher Efficiency Transformers Purchased for Delaware	2011	2012	2013	2014	2015
Estimated Annual Quantities (Units Installed)	2,393	2,393	2,393	2,393	2,393
Cumulative Annual Average Demand Savings (kW)	472	943	1,415	1,886	2,358
Cumulative Annual Energy Savings (MWh)	4,131	8,262	12,392	16,523	20,654

Assumptions:
1. Transformer usage will be flat for next several years based on forecasted URD and housing construction.
2. All transformers purchased within each year will be installed within that year.

Savings from Mercury Vapor to High Pressure Sodium Streetlight Replacements

As a result of EPACT 2005, the Federal Government banned the manufacture and importation of Mercury Vapor (MV) streetlight ballasts, effective January 1, 2008. After a review of options, PHI implemented a plan to proactively replace MV streetlights over a five year period with High Pressure Sodium (HPS) streetlights throughout its three regional utility companies, including Delmarva Power.

There are several advantages for converting to HPS from MV technology. Both sources are in the High Intensity Discharge (HID) family of lighting products, where gas vapors are held captive in an arc tube and, when a current is applied, the gas particles are excited and result in the production of an intense light. MV is the oldest form and least efficient (lowest efficacy) of the HID lighting choices. HPS offers a level of performance that is acceptable to many users, and improvements have been made over the years to develop the product to where it provides advantages over the MV source. Both HPS and MV lighting technologies have the same average life of 24,000 hours of operation for a standard lamp. HPS lamps also provide a softer, warmer color of light when transitioning from areas of complete darkness. While all HID lamps contain a specific level of Mercury, HPS lamps contain less mercury than MV and other HID sources. HPS also has better "lumen maintenance" than MV technology. Basically, an HPS lamp maintains its lumen output longer than an MV lamp while approaching its end of life. An HPS lamp will remain brighter for the same life span when compared to an MV lamp. On average, when both lamps are replaced after 5-1/2 years, the MV lamp will look visually dimmer than the HPS lamp.

Delmarva Power will reduce the energy consumption of current MV lamp users by offering increased lumen output of light for the customer at a lower power consumption value (wattage) by replacement with HPS lamps. For example, customers presently using a 175W MV lamp will receive approximately 7,900 lumens of light. Delmarva Power will provide a 100W HPS lamp and increase the customer's lumen output by approximately 25% to 10,000 lumens. These types of improvements can be made because HPS offers an efficacy of 120 lumens per watt when compared to the 50 lumens per watt output of MV. Given the same power output, HPS provides more than twice as many lumens as MV.

The below Table B.14 indicates the cumulative annual energy savings (in MWh) that will be realized through the MV to HPS Group Replacement Program for the Delmarva Delaware region which began in 2008.

Table B.14
Street Light Savings

Delaware MV to HPS Conversion Project	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Fixtures/Lamps to be Replaced (number)	1,500	1,500	1,500	1,500	0	0	0	0	0	0	0
Cumulative Annual Energy Savings (MWh)	1,386	1,764	2,142	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520

Notes:
1. The average energy savings per light per year is 252 KWh/yr. The cumulative annual savings for 2011 is 378 MWh/yr for the 1500 installed plus the cumulative savings for 2008, 2009 and 2010 which adds up to 1386 MWh/yr. and then for the year 2012 added 378 MWh/yr to the 2011 number to come up with the 1764 MWh/yr energy savings and the other years are calculated the same way.

Demand and Energy Savings from Delmarva Power Initiatives Only

The projected cumulative impacts of the combined Delmarva Power's DSM initiatives for the IRP reference case are shown in Table B.15 below.[34]

Table B.15
Reference Case Projected Delmarva Power Cumulative DSM Impacts

Reference Case Projected Delmarva Cumulative DSM Impacts										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Energy Impacts (MWh)										
Residential Load Control	3,546	6,183	8,905	10,215	11,562	12,956	13,966	14,977	15,988	17,000
Non-Residential Load Control	0	102	732	1,260	1,289	1,316	1,345	1,367	1,391	1,412
T&D Efficiency Improvements	4,408	8,814	18,107	22,512	26,884	31,261	35,644	40,031	44,421	48,816
CHP Potential Savings	61,503	95,335	129,167	162,999	196,831	251,191	305,552	359,912	414,272	468,633
AMI Enabled Dynamic Pricing	1,279	35,826	36,304	34,721	33,225	33,464	33,866	34,243	34,640	35,057
Total Energy Impact	70,736	146,259	193,214	231,707	269,791	330,189	390,372	450,529	510,713	570,918
Demand Impacts (MW)										
Residential Load Control	25.4	31.9	40.9	43.1	47.0	51.8	50.4	49.0	47.7	46.3
Non-Residential Load Control	0.0	2.1	15.2	26.2	26.8	27.4	28.0	28.5	29.0	29.4
T&D Efficiency Improvements	0.5	1.1	3.0	3.6	4.1	4.7	5.2	5.8	6.3	6.9
CHP Potential Savings	8.8	13.6	18.5	23.3	28.2	36.1	44.0	51.9	59.8	67.7
AMI Enabled Dynamic Pricing	2.9	81.6	122.4	120.5	118.3	119.6	120.3	122.2	124.3	126.4
Total Demand Impact	37.6	130.2	200.1	216.8	224.4	239.5	247.9	257.4	267.0	276.7

Impacts on Savings from Changes in Codes and Standards

[34] The exact implementation schedule of these and other programs will depend on the final Delaware Sustainable Utility implementation timing and the timing of any required regulatory approvals for utility provided programs. Third party vendor capability, equipment availability, and program market receptivity will also affect the timing of initiatives. Savings estimates were developed based upon information available to Delmarva Power as of May 2010. The CHP incentive program identified in the table could be offered by either Delmarva Power or the Delaware Sustainable Energy Utility.

The Act further states that there shall be requirements to establish methods for calculating codes and standards savings, including the use of verified compliance rates. Delmarva Power has also considered the potential savings impact of code and standard improvements in Delaware in calculating the total attainable demand and energy consumption savings. The major impacts from codes and standards that are currently in effect and are not already captured in the load forecasting are air conditioning minimum efficiency requirements and Federal lighting efficiency requirements which go into effect starting in 2011. Since the SEU programs contain residential and non-residential lighting efforts that extend through 2017 separately, the codes and standards impacts of the lighting efficiency requirements could result in potential double counting of savings. Therefore only the impact of the air conditioning minimum efficiency requirements that are not captured by either load forecasting or the identified SEU programs was estimated.

The basis for the analysis is that there is energy savings that is not captured in energy efficiency programs which results from the higher minimum efficiency requirements. When an air conditioner is replaced, the current minimum efficiency is significantly higher than the original unit that was replaced. Since an efficiency program only claims savings that are above the required minimum efficiency, any savings resulting from reaching the minimum efficiency are not accounted for in the efficiency program impacts. Likewise the load forecasts only account for the savings that have been recognized from new equipment which has been installed, not what will be installed in the future. An analysis was performed to estimate the impacts resulting from the higher minimum efficiencies required for residential and non-residential air conditioning replacement. The results of the analysis are shown in Table B.16.

Table B.16
Codes and Standards Impacts

Estimated Cumulative Codes and Standards Energy Impacts (MWh)										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Residential	20,403	40,807	61,210	81,613	102,017	122,420	142,823	163,227	183,630	204,033
Non-Residential	16,392	32,784	49,176	65,568	81,960	98,352	114,744	131,136	147,528	163,920
Total	36,795	73,591	110,386	147,181	183,977	220,772	257,567	294,363	331,158	367,953

Modeling Assumptions – Demand Side Management Impacts Aggregation and Goal Contributions

In order to prepare the energy and demand impacts of the various demand side efforts described above for use in the IPM modeling process, the impacts were aggregated to achieve the goals identified in Table B.2. To reach the identified goals, impacts from the Approved SEU Programs, Residential and Non-Residential Load Control, T&D Efficiency Improvements, CHP, AMI Enabled Dynamic Pricing and Codes and Standards were totaled. In years 2011 – 2020 where the impacts from these DSM initiatives did not reach the goals identified in Table B.2, impacts sufficient to reach the goals were included from the Prospective SEU Programs. When impacts from the Prospective SEU Programs were included, the residential and C/I program contributions are in the same proportion as residential and C/I shares of the total projected SEU Prospective Program impacts.

Initiative Savings for Legislatively Established Target Years 2011 and 2015

Charts B.17 through B.20 graphically represent the mix of initiatives selected to achieve the energy and demand savings for years 2011 and 2015.

Chart B.17

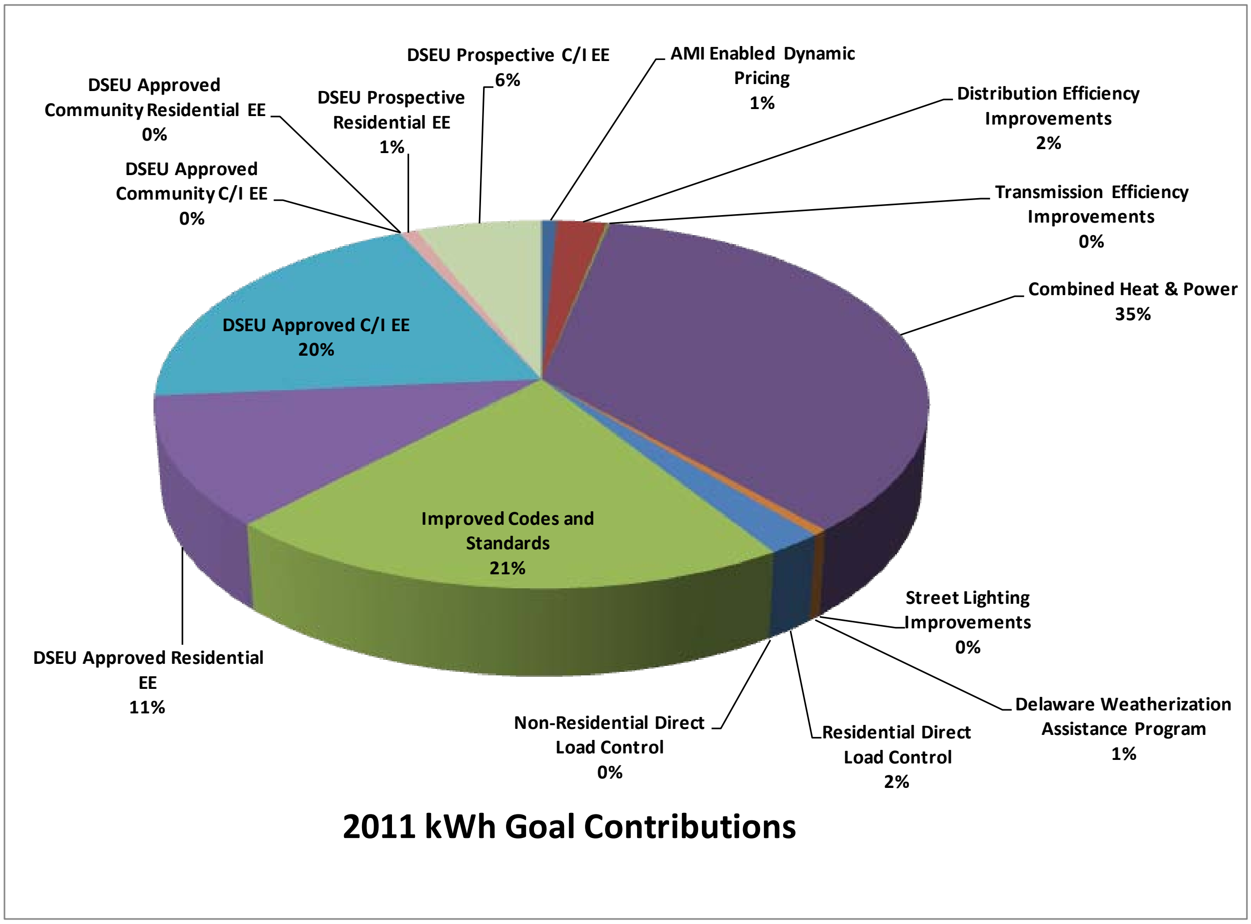

DSEU Prospective C/I EE
6%
AMI Enabled Dynamic Pricing
1%
Distribution Efficiency Improvements
2%
Transmission Efficiency Improvements
0%
Combined Heat & Power
35%
DSEU Approved Community Residential EE
0%
DSEU Prospective Residential EE
1%
DSEU Approved Community C/I EE
0%
DSEU Approved C/I EE
20%
Improved Codes and Standards
21%
Street Lighting Improvements
0%
DSEU Approved Residential EE
11%
Delaware Weatherization Assistance Program
1%
Non-Residential Direct Load Control
0%
Residential Direct Load Control
2%
2011 kWh Goal Contributions

Chart B.18

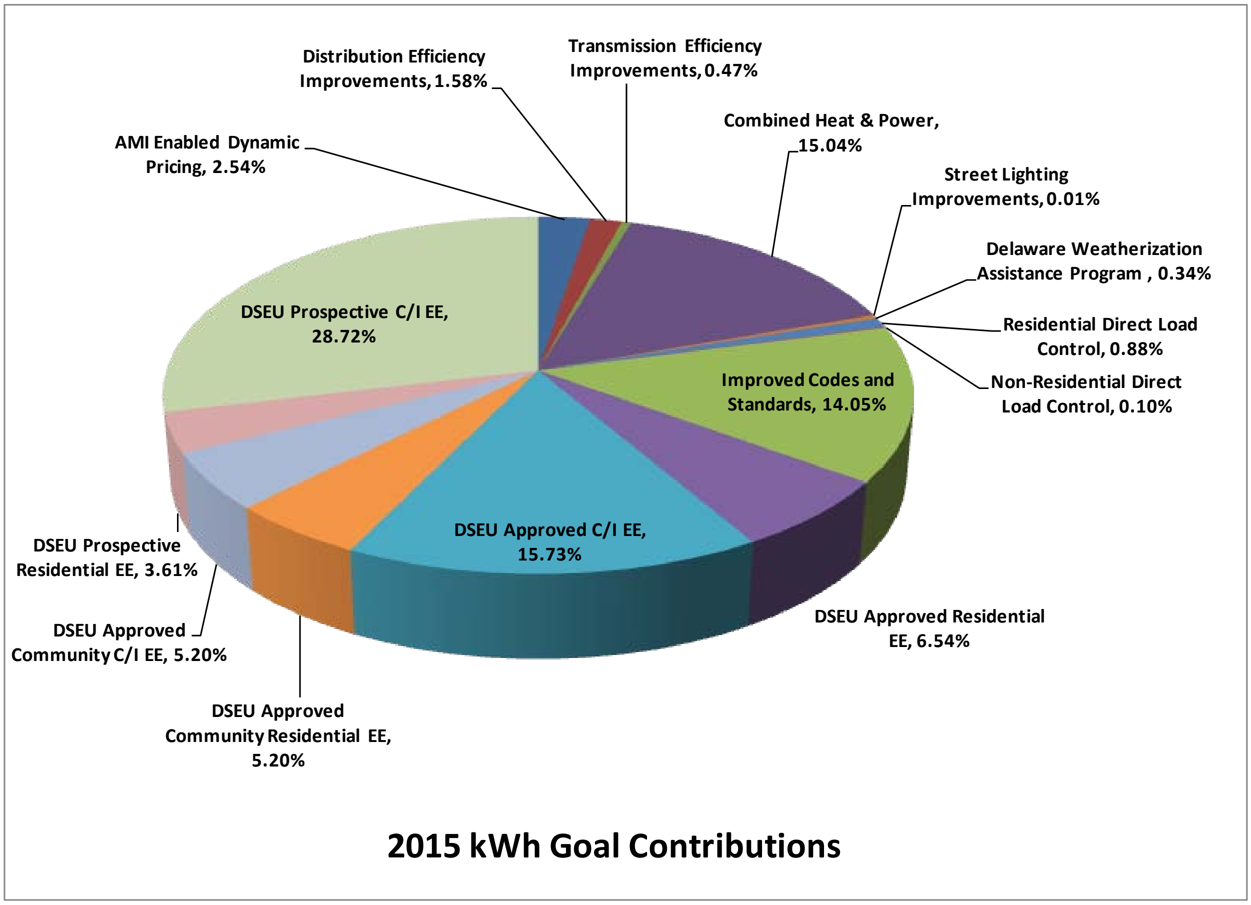
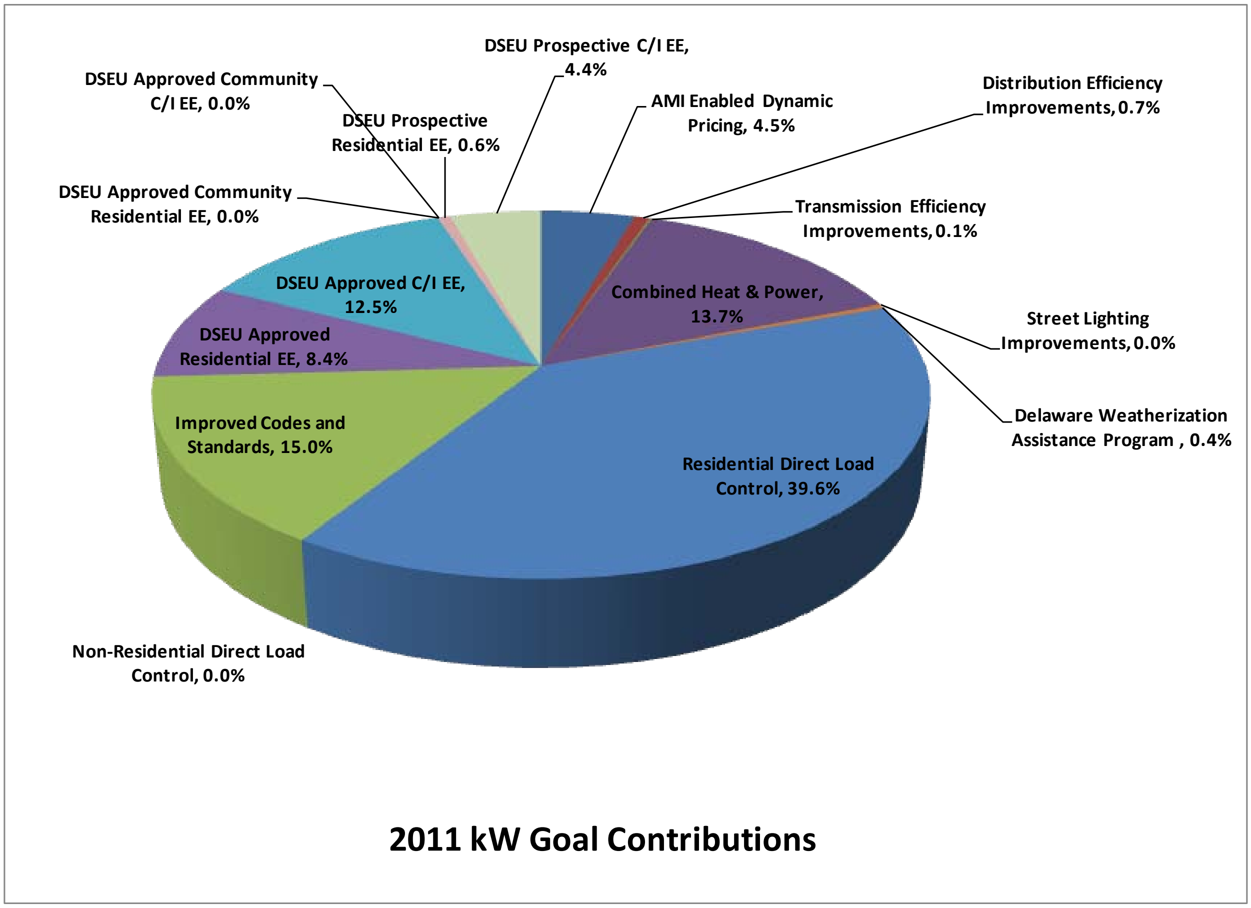
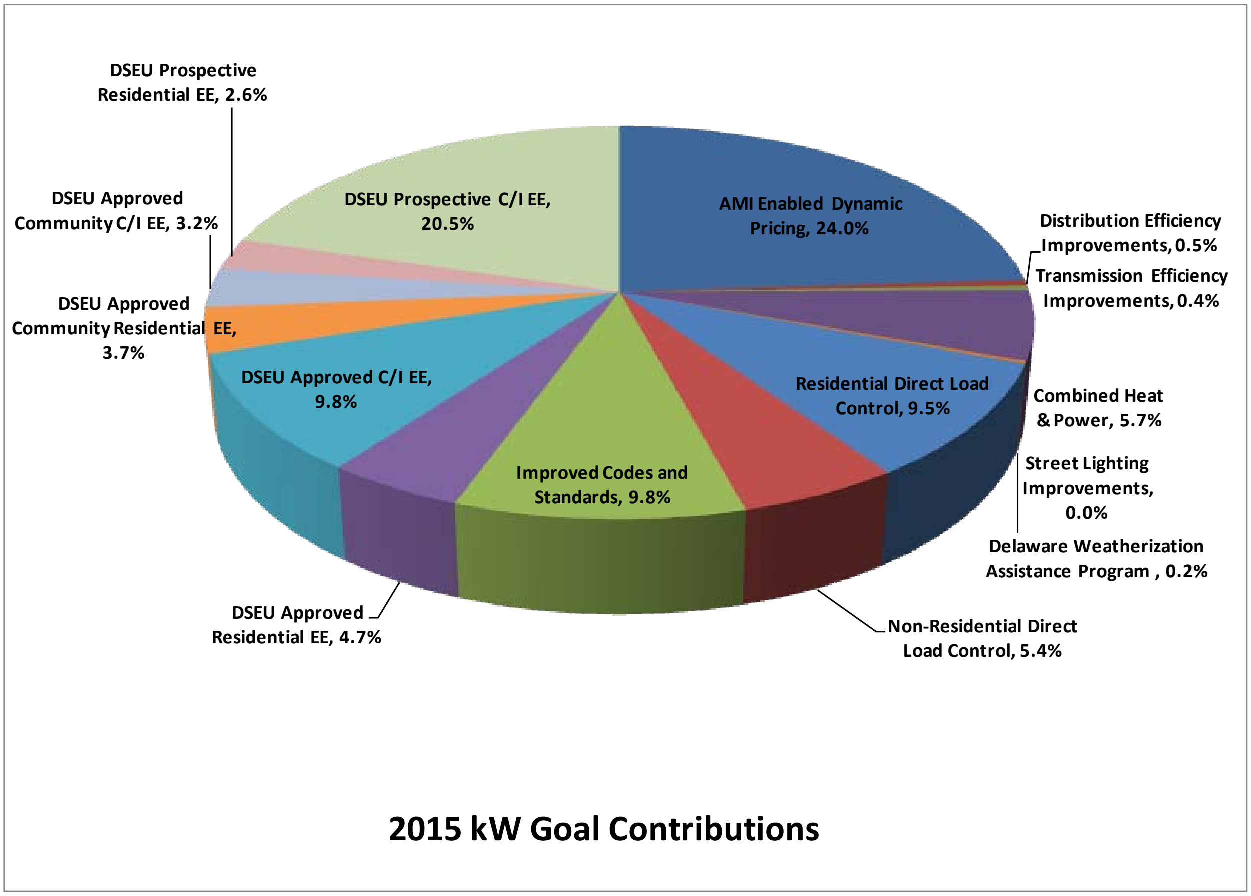

Distribution Efficiency Improvements, 1.58%
Transmission Efficiency Improvements, 0.47%
AMI Enabled Dynamic Pricing, 2.54%
Combined Heat & Power, 15.04%
Street Lighting Improvements, 0.01%
Delaware Weatherization Assistance Program , 0.34%
DSEU Prospective C/I EE, 28.72%
Residential Direct Load Control, 0.88%
Improved Codes and Standards, 14.05%
Non-Residential Direct Load Control, 0.10%
DSEU Approved C/I EE, 15.73%
DSEU Prospective Residential EE, 3.61%
DSEU Approved Residential EE, 6.54%
DSEU Approved Community C/I EE, 5.20%
DSEU Approved Community Residential EE, 5.20%
2015 kWh Goal Contributions

Chart B.19



DSEU Prospective C/I EE, 4.4%
DSEU Approved Community C/I EE, 0.0%
DSEU Prospective Residential EE, 0.6%
AMI Enabled Dynamic Pricing, 4.5%
Distribution Efficiency Improvements, 0.7%
DSEU Approved Community Residential EE, 0.0%
Transmission Efficiency Improvements, 0.1%
DSEU Approved C/I EE, 12.5%
Combined Heat & Power, 13.7%
DSEU Approved Residential EE, 8.4%
Street Lighting Improvements, 0.0%
Delaware Weatherization Assistance Program , 0.4%
Improved Codes and Standards, 15.0%
Residential Direct Load Control, 39.6%
Non-Residential Direct Load Control, 0.0%
2011 kW Goal Contributions

Chart B.20



<u>Allocation of Impacts Across Hours</u>

To prepare the demand side energy impacts for use in the ICF IPM model it is necessary to create an hourly impact load shape. Since the energy impacts provided by the SEU and other entities were not created using hourly modeling, the necessary load shapes could not be developed directly from the available data. An alternative methodology was employed which used hourly information from the ICF Energy Efficiency Planning Model library to create a representative hourly load shape from the annual energy impacts described above.

The library planning model selected for use was the South Atlantic North (SAN) census region model. The SAN model is an energy efficiency potential model for the states of Delaware, Maryland, Virginia and West Virginia. The SAN model was selected because of its relevance to Delaware and the similarity of the efficiency measure groups which were analyzed and the measures likely to be included in the SEU programs, which comprise a large share of the energy efficiency impacts. The efficiency measure groups that are considered in the SAN model are shown in Table B.24.

Table B.24
SAN Model Efficiency Measure Groups

SAN Model Efficiency Measure Groups	
RES Efficient Windows	COM Efficient HVAC
RES Efficient Insulation	COM Efficient Boilers
RES Reduced Infiltration	COM Efficient Ducts
RES Efficient Ducts	COM Fluorescent Lighting
RES Efficient Space Cooling Equipment	COM Metal Halide Lighting
RES Efficient Space Heating Equipment	COM Solid State Lighting
RES Efficient Electric Water Heating	COM ENERGY STAR Appliances
RES Incandescent to Fluorescent Lighting	COM CPU Power Management
RES Halogen to Fluorescent Lighting	COM Efficient Refrigeration
RES Solid State Lighting	COM LEED Certification
RES Efficient Refrigerators	COM Building Retro-Commissioning
RES Efficient Clotheswashers	COM Building Commissioning

The hourly load shapes were developed in a three-step process. The first step was to develop hourly factors for total residential and non-residential measures in the model which represent an individual hour's contribution to each annual kWh of residential and non-residential savings. The second step was to aggregate the annual incremental energy-efficiency impacts for residential and non-residential initiatives. The final step was to multiply the appropriate residential or non-residential hourly factor by the total annual impact to calculate each hour's annual contribution. This calculation was performed for each year from 2011 – 2035.

Hourly load shapes are not required for the analysis of load control impacts in the IPM Model. For load control impacts the annual residential and non-residential impacts are utilized.

Contingency Planning

In section 3.2.7 of the new rules governing the preparation of future IRPs, there is a requirement that there be a contingency plan "should one of the supply, demand, or transmission options be either delayed or not realized."

The Act contains a requirement in 26 *Del. C.* § 1502(b) stating that "Affected Electric Energy Providers shall submit to the State Energy Coordinator a report on April 1, for the prior year, demonstrating that it, in cooperation with the SEU and the Weatherization Assistance Program, has achieved cumulative Energy Savings in the previous year that are at least equal to the Energy Savings required by regulations adopted by the Secretary pursuant to 1502(a) of this Chapter".

Several factors could impact when and if Delmarva Power's planned demand response programs or the SEU's energy efficiency programs realize the projected savings. For the demand programs, timing of the filing and ultimate Commission approval of forms of dynamic pricing and demand load control programs could be an issue. Additionally, any delays in the deployment of AMI could delay implementation of both sets of programs. For the SEU, insufficient funding or other factors could delay implementation of programs and/or end them early. Additionally, both Delmarva Power demand response programs and SEU energy efficiency programs are subject to impacts of the current economy such as slow participation rates. Customer market receptivity will influence achieved demand reductions.

In the event that any of the above referenced issues occur and these programs are delayed or do not attain the expected savings impacts and it is reflected in the required annual report that Delmarva Power has not achieved the Energy Savings required for the given year, the Act permits an additional Energy Efficiency Charge to be created on Delmarva Power utility bills and states "[s]hould an Affected Energy Provider determine that an energy efficiency charge is necessary to achieve the goals, they may make such a recommendation in the Workgroup study that is consistent with subsection 1505."

Additionally, if savings are not achieved, the Company will initiate working groups with all stakeholders, including the SEU, to discuss possible revisions to program plans and other alternatives which could be used to comply with the IRP regulations. During these meetings, the Company will offer alternative programs and approaches to achieving energy and demand savings.[35]

[35] The SEU is free to develop whatever supplemental initiatives or energy efficiency programs it determines appropriate.

Section 3c Transmission

Delmarva Power's transmission facilities are located within the PJM Regional Transmission Organization ("RTO"). Delmarva Power works with PJM to ensure that reliability standards are met and that the necessary transmission facilities are built to meet the short term and long term needs of the Delmarva Peninsula.

PJM, as the RTO, is responsible for ensuring:

- Adequate generation or demand side resources across the entire region,; and
- Adequate transmission capacity to reliably and efficiently deliver the generation capacity where it is needed.

PJM meets these objectives by administering competitive markets that encourage merchant generation, transmission and demand-side resources. In addition, PJM, as the regional planner, identifies necessary transmission enhancements, in conjunction with Delmarva Power's planners, which are then included in the PJM Regional Transmission Expansion Planning ("RTEP") process.

PJM's planning process is a rigorous process that is outlined in PJM Manual 14-B, available on the PJM web site. The planning process takes into account the requirement that the future transmission system meet all applicable reliability criteria including: North American Electricity Reliability Council ("NERC"), Reliability First Corporation, PJM and Delmarva local planning criteria. PJM tests the system under both expected normal peak conditions and extreme conditions where peak loads are higher than forecasted and there are more generating units out of service than would be expected under normal peak conditions. Based on this analysis, PJM with support from Delmarva, together develop a detailed 5 year plan to ensure that the transmission system has sufficient capability to serve the load. The transmission system plans that are developed include upgrades and additions to the transmission system as well as new reactive sources to assure that adequate transmission system voltages are maintained under all tested conditions. The table below provides a detailed listing of the individual transmission system upgrades that comprise the 5 year plan for projects in Delaware. A short description of each project as well as the PJM project ID#, expected in-service date and projected project cost are provided in the table. The information listed in the table is also available on the PJM web site.

Upgrade ID#	Project Description	In-Service Date	Estimate Cost ($M)
B0480	Lank/Five Points 69kV - Upgrade Conductor	5/31/2011	$1.699
B0568	Indian River Sub - Add 3rd 230/138kV Transformer	6/1/2011	$12.119
B0513	Maridel/Ocean Bay 69kV - Upgrade Conductor	6/1/2012	$1.560
	Five Points/Lewes 69kV - Rebuild	5/31/2013	$0.256
B0752	Reybold/Lums Pond 138kV - Upgrade	5/31/2013	
B0754	Glasgow/Mt. Pleasant 138kV - Rebuild	5/31/2013	$14.582
B0725	Steele Sub - Add 3rd 230/138kV Transformer	6/1/2013	$8.653
B0751	Keeney 500kV - Additional Breakers	6/1/2013	$7.261
B0733	Harmony Sub - Add 2nd 230/138kV Transformer	6/1/2012	$12.229
B0732	Vaughan/Wells 69kV - Rebuild	6/1/2013	$1.261
B0737	Indian River/Bishop 138kV - New Line	6/1/2013	$13.564
B873	Glasgow - Mt. Pleasant 138kV - 2nd Line	6/1/2013	$11.640
B876	138th Street Sub - 50 MVAR SVC	6/1/2013	$16.141
B874	Brandywine Sub - Reconfiguration	6/1/2013	$15.241
B1247	Glasgow/Cecil 138kV - Rebuild	5/31/2015	$6.942
B1246	Townsend/Church 138kV - Upgrade	5/31/2015	$13.564
B1249	Sussex Sub - Reconfigure Capacitor	5/31/2015	$1.272
B1248	Loretto Sub - Install 69kV capacitors	5/31/2015	$1.612

Figure - 1

Figure 1 above includes all plans needed for reliability in Delaware. The load flow cases include all assumptions about the expected load forecasts, the Demand Response programs, and the proposed generation available. For example, the load flow cases that were used for 2015 planning year assumed that Indian River units #1, #2, and #3 were all retired. PJM will finalize the complete list projects by the end of the year that will be used as part of the RTEP 2010 report which will be issued by February 2011.

Upgrade ID#	Project Description	In-Service Year
B0387	North Seaford Sub - Add 2nd 138/69kV Transformer	2008
B0296	Rehoboth/Cedar Neck Tap 69kV - Upgrade Conductor	2008
B0482	Millsboro/Zoar 69kV - Upgrade Conductor	2008
B0241	Red Lion Sub - Reconfigure 2nd 500/230kV Transformer	2009
B0261	Red Lion/Reybold 138kV - Upgrade Terminal Equipment	2009
B0260	Red Lion Sub - Add 2nd 230/138kV Transformer	2009
B0262/B0415	Christiana/Edge Moor 138kV - Rebuild Portion of Conductor	2009
B0389	Indian River Sub - Replaced 138/69kV Transformers	2009
B0414	Christiana/New Castle 138kV - Rebuild Portion of Conductor	2009
B0295	N. Seaford/Pine Street/DuPont Seaford 69kV - Upgrade Conductor	2009
B0316	Laurel/Mumford 69kV - Upgrade Conductor	2009
B0291	Harmony/Edgemoor 230kV - Upgrade Conductor	2009
B0320	Harbeson/Lank 69kV - Upgrade Conductor	2009
B0263	Indian River/Frankford 138kV - Upgrade Terminal Equipment	2010
B0320	Cool Spring Sub - New 230/69kV Station	2010
B0485	N.Seaford/Taylor 69kV - Upgrade Conductor	2010
B0527	Bethany Sub - Add 69kV 2-staged Cap Bank	2010
B0528	Bethany Sub - Add 138/12kV Transformer	2010
B0567	Mt. Pleasant/Middletown/Townsend 138kV - Rebuild	2010

Figure - 2

Figure 2 shows the Delaware RTEP projects that were constructed by year since the last Delaware Integrated Resource Plan (IRP) was submitted. The projects addressed reliability concerns and were identified by PJM in their Regional Transmission Expansion Planning (RTEP) process. In addition, these projects helped mitigate economic concerns by lowering congestion hours for all Delaware customers.

In addition to this 5 year detailed plan, PJM also develops a 15 year plan to determine the need for new major backbone transmission projects at 500kV and above. This long term planning process has identified the need for a major 500kV transmission upgrade which will serve the Delmarva Peninsula. This upgrade is the Mid-Atlantic Power Pathway ("MAPP"), shown in the diagram below. The 500kV portion of the MAPP project was approved by the PJM Board of Managers in October 2007. PJM has recently confirmed the need for the project and has a projected in-service date of 2015. MAPP will provide additional reliability and economic benefits to the Delmarva Peninsula.

PHI/Delmarva has made significant progress towards meeting the projected in service date for the MAPP project. PHI/Delmarva has a project manager and core team for this project to execute the siting, permitting and construction phases of the project. Initial design, siting, environmental and community outreach activities have begun. PHI filed the supplemental Certificate of Public Convenience and Necessity ("CPCN") application for the entire MAPP project in Maryland on November 12, 2010. The Virginia CPCN is expected to be filed by the end of the year. PHI has worked with PJM to evaluate various technology options for crossing the Chesapeake

Bay. At the October 15, 2008 Transmission Expansion Advisory Committee (TEAC) meeting, PJM recommended that DC technology be used for the crossing of the Chesapeake Bay. This will increase transfer capability, allow greater controllability of flow on the line and have a smaller footprint in the Chesapeake Bay.

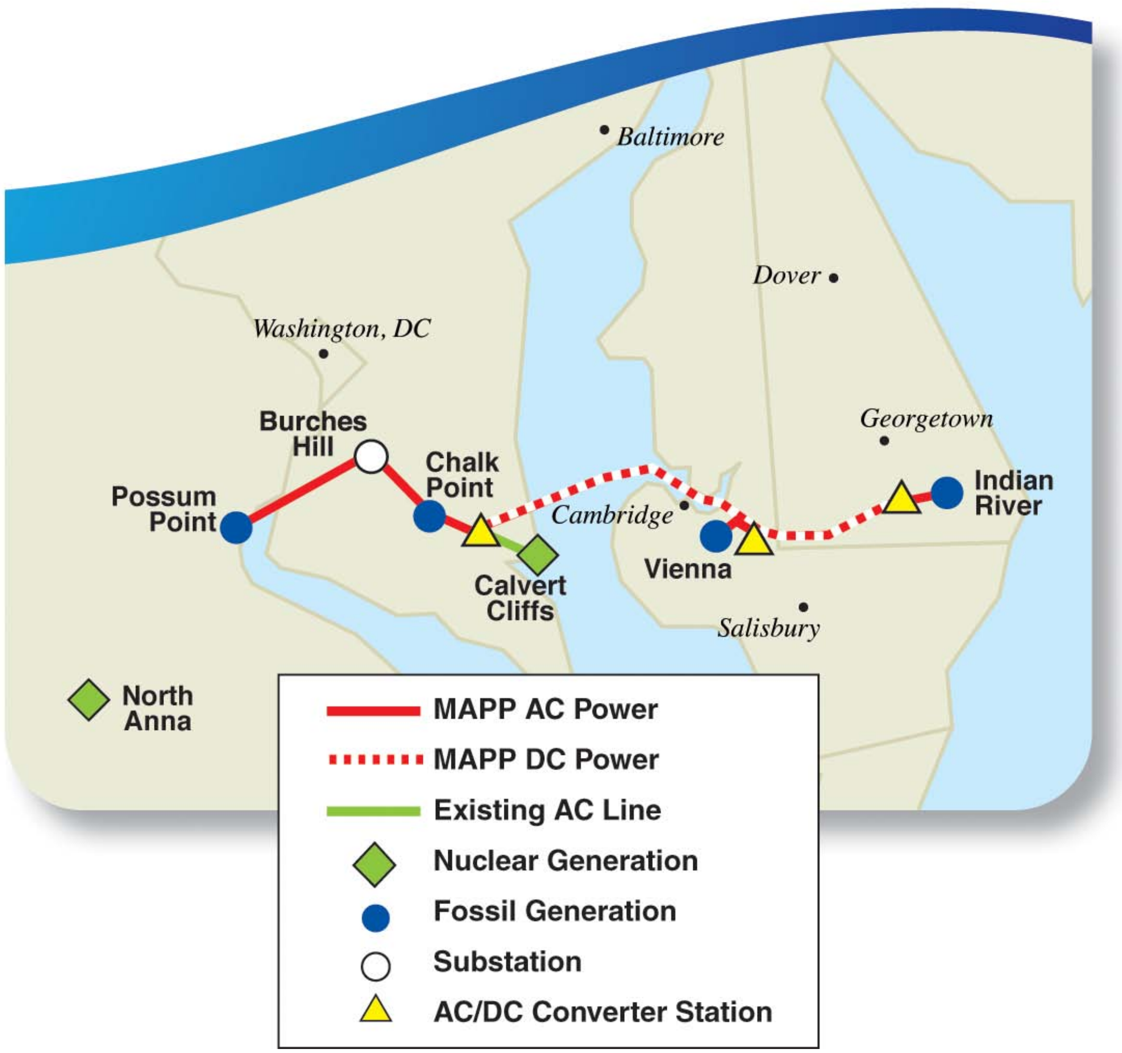
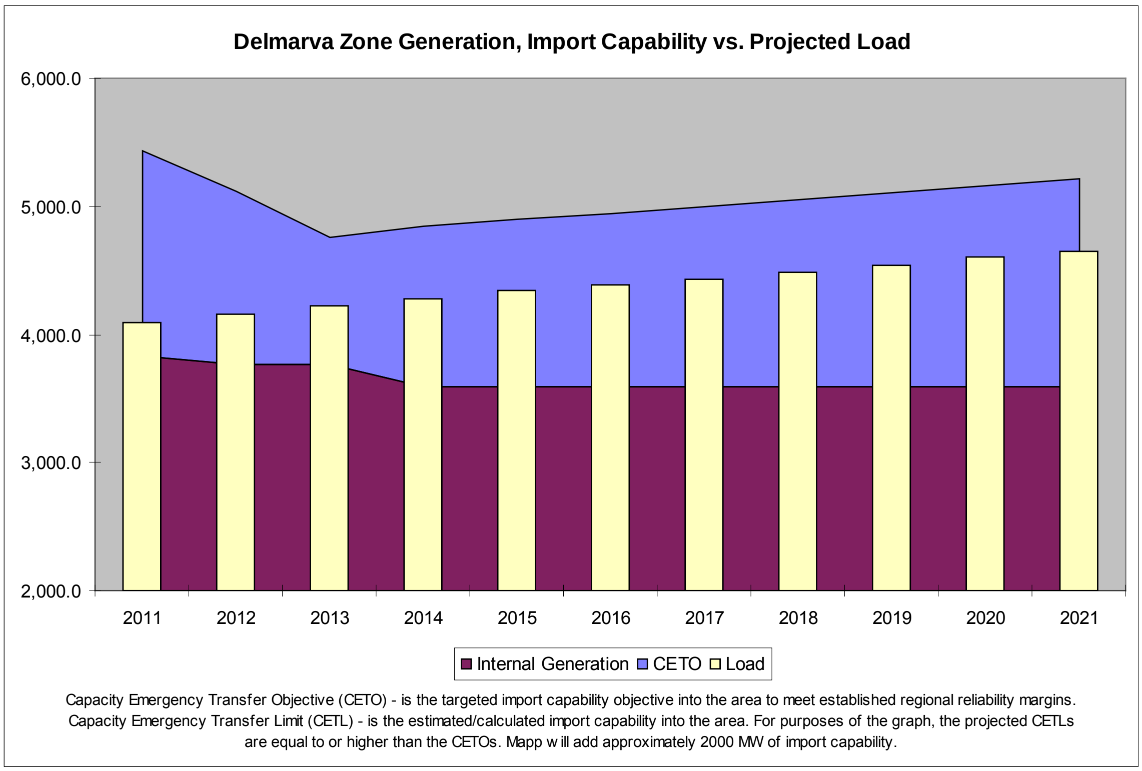


Figure - 3

The line segment from the western shore of Maryland to the eastern shore of Maryland including the Chesapeake Bay Crossing is projected to be completed by 2015 (See Figure 3). One significant change to the MAPP project is the design to stay underwater following the Choptank River avoiding the need to travel by land through much of Dorchester County, MD. The Company established a separate web site for the MAPP project at www.powerpathway.com. This web site will be an important link to our stakeholders going forward and a location where questions will be answered and updates posted.



Sources: Projected Load: PJM Load Forecast Report dated Jan 2010
Generation Data: 2009 PJM Load, Capacity and Transmission Report dated Jan. 13, 2010
(Generation Includes the retirements of Indian River #1, #2 and #3. It does not include any potential future generation within the Delmarva Zone.)

Figure – 4

The graphical data in Figure 4 shows the import capabilities into the Delmarva zone with respect to the zonal load. The Capacity Emergency Transfer Objective (CETO) targets were calculated and are published by PJM through study year 2013. The remaining years were estimated based on the future load forecasts within Delmarva which includes the effects of Demand Resources (DR) and Energy Efficiency (EE) programs. The decline of the CETO values through 2013 could be attributed to the higher DR allocation projected over the next few years. The CETO numbers will then be estimated based on load and DR factors will saturate and remain constant for future years.

The graph above shows Delmarva having sufficient generation margins with respect to CETO. In addition, MAPP is expected to contribute up to 2,000 MW's to the import capability when the project becomes commercial in 2015.

Contingency Plan

The PJM RTEP considers the five year needs of the regional transmission system and is updated on an annual basis. As new decisions are made during the RTEP process, Delmarva updates its plans accordingly.

3d. Supply Resources

This Section discusses the generation supply options analyzed in this study.

In order to optimize the resource mix overtime, the analysis considered alternative power supply options. The optimization was based on a discounted cash flow and cost minimization decision process endogenous to the model used by ICF – the Integrated Planning Model (IPM® - see Appendix 4 for a detailed description of the model). The generation addition options which were characterized within IPM® and considered as possible options include:

Natural Gas-Fired Combined Cycle – These plants use a combination of steam turbine and combustion turbine technologies and capture the waste heat from the gas turbine exhaust produced during electricity generation and reuse it to generate steam for the steam turbine to generate additional electricity. Combining these two cycles results in higher overall efficiency.

Natural Gas-Fired Peaking Combustion Turbine – This plant has lower thermal efficiency and capital costs and shorter construction lead times than Combined Cycle and Cogeneration Units. These peaking units also offer quick start capability.

Areoderivatives (LM6000s and LMS100s) - Similar to peaking combustion turbines, aeroderivative capacity offers short construction times, quick start capability, and have lower capital costs than combined cycles. LM6000s and LMS100s typically are sized at much smaller increments than combustion turbines, have a smaller footprint, can be constructed in a much shorter time, and are more thermally efficient. However, these units also have a higher capital cost than combustion turbines.

Integrated Gasification Combined Cycle (IGCC) - Instead of burning coal directly, IGCC plants convert coal into gas prior to combustion. Gasification helps in achieving lower levels of pollutant emissions. Using a combined-cycle technology, higher thermal efficiencies are achieved. IGCC plants have higher capital costs than traditional pulverized coal plants.

Supercritical Pulverized Coal (SCPC) - Nearly all U.S. coal plants are designed to use pulverized coal, and supercritical plants are designed to increase the plant's thermal efficiency. The plant is highly controlled for sulfur dioxide (SO2), nitrogen oxides (NOx), and mercury (Hg). Because this type of coal plant is actively being considered by other utilities, it is modeled as an option for other northeastern U.S. utilities.

Integrated Gasification Combined Cycle with Carbon Capture Sequestration (IGCC CCS) - The IGCC with carbon capture includes a water-shift process for concentrating CO2, Selexol absorption of CO2 and CO2 compression for pipeline injection. Selexol is currently considered the state of the art sorbent for CO2 capture for IGCC.

Supercritical Pulverized Coal with Carbon Capture Sequestration (IGCC CCS) - The supercritical coal unit carbon capture includes the cost of a MEA (monoethanolamine) absorber-stripper system and CO2 compression for pipeline injection. Amine based sorbents are currently considered state of the art for CO2 removal for supercritical coal units.

Nuclear – Nuclear generation is currently the second largest generation source in the U.S. New nuclear facilities face a number of hurdles prior to any future development largely due to siting concerns. The analysis assumes that no completely new facilities will be able to be online within the next ten years. However, uprates at existing facilities are directly accounted for in this period.

Solar – Central and rooftop/distributed generation options are considered.

Wind – On- and off-shore wind facilities are considered. Wind resources are generally the dominant source of generation to be used to meet requirements under Renewable Portfolio Standard programs. The analysis considers the potential for new wind resources to be added throughout PJM and the US. On-shore resources are characterized at three distinct tiers of units based on the combination of the expected facility performance and the construction costs of units. The Step 1 resources have the lowest capital costs while the Step 3 resources have the highest. Each Step may achieve varying output levels (capacity factor) depending on the ambient conditions which are defined by wind classes; each step has 4 associated wind classes which are modeled, Class 3, 4, 5, and 6. Capacity factor is 32% for Class 3, 34% for Class 4, 38% for Class 5, and 40% or higher for Class 6 resources. In addition, off-shore units are also considered in the analysis within coastal market areas and have a distinct cost and performance characteristics.

Biomass - Biomass plants use organic materials such as wood, agricultural and animal waste. Biomass resources are considered a renewable resource

Landfill Gas - Landfill gas plants use the gas (methane) naturally produced by the decomposing garbage in the landfill to generate electricity. Landfill Gas resources are considered to be renewable resources.

Power Purchases and Sales Reflecting Short-Term Market Conditions – Wholesale power import and export options are modeled in each hour. For the peak, capacity or reliability transactions are modeled.

Exhibits 2.1 and 2.2 present a summary of the assumptions related to new conventional resource options for Delaware. Exhibit 2.3 presents costs and characteristics for renewable resources. The capital cost assumptions reflect ambient conditions in Delaware and demonstrate regional variances depending on the cost of labor and construction material in those regions. All costs are in 2009 dollars.

Exhibit 2.1: Delaware Conventional Resource Options Capital Cost Assumptions

Resource Type	Earliest Online Year	Capital Cost (2009$/kW)	Fixed O&M Cost (2009$/kW)	Forced Outage Rate
Combustion Turbine	2011	893	7.4	2.4%
Combined Cycle	2014	1,218	10.5	1.3%
Aeroderivatives (LM6000)	2010	1,262	10.2	1.3%
Aeroderivatives (LMS100)	2010	1,041	10.2	1.3%
Supercritical Pulverized Coal	2015	2,815	28.9	6.3%
Integrated Gasification Combined Cycle	2016	3,595	33.8	6.3%
Supercritical Pulverized Coal with Carbon Capture Sequestration	2020	6,275	42.1	6.3%
Integrated Gasification Combined Cycle with Carbon Capture Sequestration	2020	5,704	44.0	6.3%
Nuclear	2019	5,330	116.5	3.5%

A typical combined cycle unit requires a lead time of 36 months or more prior to coming on-line. A typical coal plant requires an even longer lead time of 4 to 5 years. Given the longer lead-time required for a combined cycle unit versus a combustion turbine unit, we assume that no new combined cycle units are possible before the summer of 2013 unless they are already under construction and will be available prior to 2010. New coal plants including IGCC plants are assumed to be available after 2015, unless in an advanced stage of development. New nuclear options become available in 2019. However, upratings to existing facilities are available during the IRP study period.

The capital costs are expected to decline in real terms at about 1 percent annually on average as a result of expected technological advancements. Technological improvements also enhance plant efficiencies reflected by improvements in heat rates over time.

Exhibit 2.2 Higher Heating Value Heat Rate (BTU/kWh)

Vintage	Combined Cycle Gas	Simple Cycle Gas	Nuclear	Advanced Coal (IGCC)	Supercritical Coal
2013	7,100 (F tech)	10,905			
2015	7,100	10,905		8,602	9,110
2020	6,800 (G tech)	10,905	10,400	8,257	9,110
2025	6,800	10,448	10,400	8,257	9,110

Exhibit 2.3 presents reduction factors for different pollution control techonologies.

Exhibit 2.3 Reduction Factors by Control Technology

Pollutant Type	Combined cycle (CC)	Combustion turbine (CT)	Integrated Gasification Combined Cycle	Integrated Gasification Combined Cycle with Carbon Capture Sequestration	Supercritical Pulverized Coal	Supercritical Pulverized Coal with Carbon Capture Sequestration
SO2	N/A	N/A	Claus Desulfurization Process – 99.9%	Claus Desulfurization Process – 99.9%	Wet FGD – 98%	Dry FGD + Baghouse – 95%
NOx	SCR – 98% (0.02 lb/MMBtu)	LNB - 95% (0.05 lb/MMBtu)	SCR – 98% (0.02 lb/MMBtu)	SCR – 98% (0.02 lb/MMBtu)	SCR – 95% (0.05 lb/MMBtu)	SCR – 95% (0.05 lb/MMBtu)
Hg	N/A	N/A	Co-Benefits – 98%	Co-Benefits – 98%	Co-Benefits – 90%	ACI – 90%

Exhibit 2.4 presents the capital, fixed and variable operating expenses for renewable technologies considered in modeling.

Exhibit 2.4: Delaware Renewable Resource Options Assumptions Summary

Resource Type	**Earliest Online Year**	**Capital Cost ($/kW)**	**Fixed O&M Cost ($/kW-yr)**	**Variable O&M Cost ($/MWh)**	**Heat Rate (Btu/kWh)**
Onshore Wind Step 1	2011	2,665	30.8	0	-
Onshore Wind Step 2	2011	3,200	30.8	0	-
Onshore Wind Step 3	2011	4,000	30.8	0	-
Offshore Wind	2016	3,956	56.97	0	-
Solar Photovoltaic-Distributed	2011	7,908	11.23	0	-
Biomass	2013	4,785	52.78	3.37	9,520
Landfill Gas	2011	2,851	113.47	0.01	13,648

1. Regional adjustment factors are applied to the costs above to reflect regional variations in labor and materials markets and altitude/temperature differentials on gas-fired technologies. Capital costs include interconnection costs.
2. Capital cost includes EPC, Soft Costs, AFUDC and generic transmission upgrades.
3. Wind development options are modeled based on geographically determined potential for higher end wind classes. Large scale development is typically class 3

or above. Class 3 capacity factors roughly 32% while class 6 is roughly 40%. Wind development costs are differentiated by site conditions primarily tied to the proximity to the transmission network. Delaware onshore potential is primarily class 3 or below and is concentrated on the coast line. Delaware also has offshore potential which is included as a development option.

The federal government offers production tax credits (PTC) to encourage wind and other renewable generation development. The PTC is assumed to be in effect at 50% level through 2015. Exhibit 2.5 presents the capital costs after applicable production tax credit for wind, biomass, and landfill and investment tax credit for solar are accounted for.

Exhibit 2.5: Delaware Renewable Resource Options Assumptions Summary with PTC/ITC

Resource Type	Earliest Online Year	Capital Cost ($/kW)
Onshore Wind Step 1	2011	1,825
Onshore Wind Step 2	2011	2,321
Onshore Wind Step 3	2011	3,063
Offshore Wind	2016	3,427
Solar Photovoltaic-Distributed	2011	5,206
Biomass	2013	3,863
Landfill Gas	2011	1,859

1. Regional adjustment factors are applied to the costs above to reflect regional variations in labor and materials markets and altitude/temperature differentials on gas-fired technologies. Capital costs include interconnection costs.
2. Capital cost includes EPC, Soft Costs, AFUDC and generic transmission upgrades.
3. Wind development options are modeled based on geographically determined potential for higher end wind classes. Large scale development is typically class 3 or above. Class 4 capacity factors roughly 33% while class 6 is roughly 40%. Wind development costs are differentiated by site conditions primarily tied to the proximity to the transmission network. Delaware onshore potential is primarily class 3 or below and is concentrated on the coast line. Delaware also has offshore potential which is included as a development option.
4. Costs reflect production and investment tax credits. Applicable production tax credit for wind, biomass, and landfill and investment tax credit for solar are accounted for in modeling.

Onshore wind options are considered in various configurations to reflect the characteristics to construct and the operational output capabilities at alternate locations. In this analysis we consider three steps of on-shore wind and a single off-shore wind option. In addition to the varying cost steps which reflect the difficulty in constructing facilities (for example, Step 3 reflects a facility in a remote location which would require extensive upgrades such as roadway clearing and lengthy transmission interconnection to come on-line while Step 1 reflects a relatively accessible location requiring typical site and interconnection investment), each step reflects the potential to build wind class 4, 5, and 6 facilities. Wind classes reflect the wind speed and height of the turbines which translate into varying and improving capacity factors at the higher classes. Based on the geographic characteristics of the area, the onshore wind potential in Delaware is limited to only the lowest wind classes which tend to have high costs and lower capacity factors. As such, wind options modeled within Delaware are consistent with this limited amount of onshore resource.

Offshore wind facilities are thought to offer several advantages over on-shore facilities. The major advantages are:

1. Wind speeds are generally stronger; a 25-40 percent gain in wind speed is typical at a few miles off-shore.
2. The potential for large contiguous development areas exists.
3. Offshore wind tends to be less turbulent, translating into less wear and tear on the turbines.
4. Offshore wind shear is lower than on-shore. This means that the boundary layer of slower moving air near the sea surface is thinner than the comparable area on land. This phenomenon allows for use of shorter towers to reach the desired hub-height average wind speed for turbine operation.

However, offshore facilities also have several disadvantages compared to onshore wind units. Among the disadvantages are the higher costs, the extremely limited experience in constructing, permitting, operating, and maintaining the facilities and their platforms. Further, due to the limited experience, the impact on the marine environment, the impact on other environmental issues, and the construction and maintenance requirements and costs also have a high degree of uncertainty surrounding them.

Levelized costs are useful metrics to compare different types of generation resources on a similar basis. Exhibit 2.6 presents the levelized costs for the technology types in IPM for Delaware. The levelized costs in Exhibit 2.6 are calculated based on the indicated capacity factors. Capacity factor reflects the number of hours a plant is expected to operate in a given year. The total cost is then spread over the number of hours to calculate a dollar per MWh cost.

Exhibit 2.6: Levelized Costs by Generation Resource Type for Delaware

Assumptions	Combined Cycle	Combustion Turbine	Nuclear	SCPC	IGCC	Wind	Solar
Total Levelized Cost ($/MWh)	99.0	175.5	112.8	107.4	142.3	136.7	433.5

Captial Cost ($/kW)	1,374	1,007	6,345	3,448	5,990	3,289	7,592
Capital Charge Rate (%)	12.1%	12.8%	10.6%	11.1%	11.0%	10.7%	10.7%
Capital Cost ($/kW-yr)	166	129	673	383	661	352	812
FOM ($/kW-yr)	10.5	7.4	116.5	39.0	55.0	31.4	11.7
Fixed Charges($/kW-yr)	176.7	136.2	789.1	421.7	715.7	383.3	824.0
Capacity Factor (%)	70%	23%	90%	85%	85%	32%	22%
Dispatch Hours (000 hours)	6.13	2.01	7.88	7.45	7.45	2.80	1.90
Fixed Costs ($/MWh)	28.8	67.6	100.1	56.6	96.1	136.7	433.5
VOM ($/MWh)	3.5	8.7	1.3	4.1	2.8	0.0	0.0
Fuel Cost ($/MMBtu)	8.0	7.7	1.1	2.5	2.5	0.0	0.0
Heat Rate (btu/kWh)	7,100	10,905	10,400	9,110	8,602	0	0
Fuel Cost ($/MWh)	56.5	83.5	11.4	23.1	21.8	0.0	0.0
VOM Cost excluding Emissions Costs ($/MWh)	60.0	92.2	12.7	27.1	24.7	0.0	0.0
SO2 Fuel content (lb/MMBtu)	0.00	0.00	0.00	0.90	0.90	0.00	0.00
SO2 Reduction Factor (%)	0%	0%	0%	95%	98.0%	0%	0%
SO2 Emission Rate (lb/MMBtu)	0.00	0.00	0.00	0.045	0.02	0.00	0.00
Levelized SO2 Allowance Price ($/ton)	62	62	62	62	62	62	62
S02 Allowance Cost ($/MWh)	0.000	0.000	0.000	0.013	0.005	0.000	0.000
Nox Emission Rate (lb/MMBtu)	0.02	0.05	0.00	0.28	0.02	0.00	0.00
Nox Allowance Price ($/ton)	638	638	638	638	638	638	638
Nox Allowance Cost ($/MWh)	0.05	0.17	0.00	0.83	0.05	0.00	0.00
CO2 Emission Rate (lb/MMBtu)	117.1	117.1	0.0	205.3	205.3	0.0	0.0
CO2 Allowance Price ($/ton)	24.4	24.4	24.4	24.4	24.4	24.4	24.4
CO2 Allowance Cost ($/MWh)	10.1	15.6	0.0	22.8	21.5	0.0	0.0
Total Variable Cost ($/MWh)	70.2	107.9	12.7	50.8	46.2	0.0	0.0
Levelized Cost w/o Emissions Costs	88.8	159.8	112.8	83.8	120.8	136.7	433.5

Notes:
Equipment acquisition costs assumed for same year.
Levelization was done for the period of 2015 through 2034.
Production Tax Credit (PTC) and Investment Tax Credit (ITC) are not included in the levelized costs.
All monetary figures are expressed in 2009 Real Dollars.

FINANCING ASSUMPTIONS FOR NEW RESOURCE OPTIONS

The following table illustrates the financial assumptions used for new resources in Delaware.

Exhibit 2.7: New Resource Options Financing Assumptions for Delaware

Financial Assumptions	Combustion Turbine	Combined Cycle/Cogeneration	Coal/Nuclear	Renewables
Debt/Equity Ratio (%)	42.5/57.5	50/50	57.5/42.5	50/50
Nominal Debt Rate (%)	7.63	7.13	7.13	7.13
Nominal After Tax Return on Equity (%)	12.75	12.75	12.75	12.75
Income Taxes[1]	40.6	40.6	40.6	40.6
Other Taxes[2] (%)	1.55	1.55	1.55	1.55

General Inflation Rate (%)	2.5	2.5	2.5	2.5
Levelized Real Capital Charge Rate (%)	12.8	12.1	10.6	10.5

Note: Financing assumptions are identical for all areas of the country, but taxes vary regionally.

1. Includes federal and state taxes.
2. Includes property taxes and insurance.

For additional capacity needed over and above the firm commitments identified as having broken ground, the model adds capacity based on the resource options described in Exhibits 2.1 and 2.2 above.

3e. Environmental Externalities

A. Introduction

The regulations governing the preparation of Delmarva's 2010 IRP were promulgated by the Delaware Public Service Commission on August 18, 2009. The regulations constitute a complete and progressive set of standards for the IRP and were negotiated with significant input from Commission Staff, Delmarva Power, the Division of the Public Advocate (DPA), the Department of Natural Resources and Environmental Control (DNREC), environmental groups such as Clean Air Council and the Energy Committee of the League of Women Voters and individual participants. Among other requirements, these new governing regulations require Delmarva to conduct an evaluation of environmental benefits and externalities associated with the utilization of specific methods of energy production.[36]

The purpose of this section of the IRP is to provide a discussion of Delmarva's approaches, assumptions and issues in:

1. Determining the external costs of energy production on human health; and
2. Conducting life cycle analysis to evaluate the environmental performance of proposed electric power generation systems in the scenario cases compared with the Reference Case on a comprehensive, technology-neutral and fuel-neutral basis.

This section, along with its corresponding appendices, also provides summary data and information to the Commission for its use in determining the relevance of this process for decision-making in the Delmarva IRP.

Delmarva has identified several issues for consideration, including the importance of peer-reviewed standards for conducting Life Cycle Analysis (LCA); uncertainties with respect to health-related externalities; and uncertainties of estimating costs related to global warming.

[36] For purposes of this evaluation, *Environmental Benefit* means the positive environmental impact minus the negative environmental impact attained by specific actions including, but not limited to, energy generation and distribution, transmission service, conservation, customer-sited generation, DR, or DSM.

Environmental Impact means the result of an action, outcome or activity related to the IRP, on natural and physical resources including, but not limited to, wetlands, sea levels, fisheries, air quality, water quality and quantity, public health, climate impacts, land masses, and ground water.

Externalities means the social, health, environmental and/or welfare costs or benefits of energy which result from the production, delivery or reduction in use through efficiency improvements, and which are external to the transaction between the supplier (including the supplier of efficiency improvements) and the wholesale or retail customer. Externalities should be quantified and expressed in monetary terms where possible. Those externalities that cannot be quantified or expressed in monetary terms shall nonetheless be qualitatively considered.

In the process of developing this work, Delmarva sought input from the public and key stakeholders through a series of technical working group meetings that covered topics on externalities (such as environmental benefits, health impacts and life cycle analysis), demand side management, conservation, modeling scenarios and load forecasting. The technical working group meetings were well-attended and participation was both dynamic and beneficial. Regular active attendees have included Commission Staff, DPA, DNREC, Clean Air Council and representatives from the League of Women Voters. While Delmarva is responsible for the analysis presented herein, these stakeholders provided valuable insight and input into the analytical process that were adopted for this IRP.

B. Approach to Evaluating Human Health Impacts Due to Power Generation

Most of the available literature on environmental externality points to global warming and the human health effects of air emissions as dominating energy externalities. This was a dominant consideration in shaping the process used by Delmarva to quantify environmental benefits and impacts.

In order to assess the externalities associated with several alternative scenarios analyzed within the IRP, Delmarva and its contractor ICF estimated the changes in air emissions and overall public health benefits and costs associated with three alternative scenarios relative to a Reference Case. The Reference Case is described in detail elsewhere in this report. The three scenarios are based on the following changes to the Reference Case:

- Scenario Case #1 - add 150 MW of off-shore wind resources to Delmarva's existing 200 MW power purchase agreement with NRG Bluewater Wind – for a total of 350 MW of off-shore wind resources.
- Scenario Case #2 - add 150 MW of land-based wind resources to the existing 150 MW power purchase agreements for land-based wind resources with AES and Synergics for a total of 300 MW of land based wind resources;
- Scenario Case #3 - procure energy and capacity from a new 135 MW gas-fired combined cycle generation resource located in Southern Delaware.

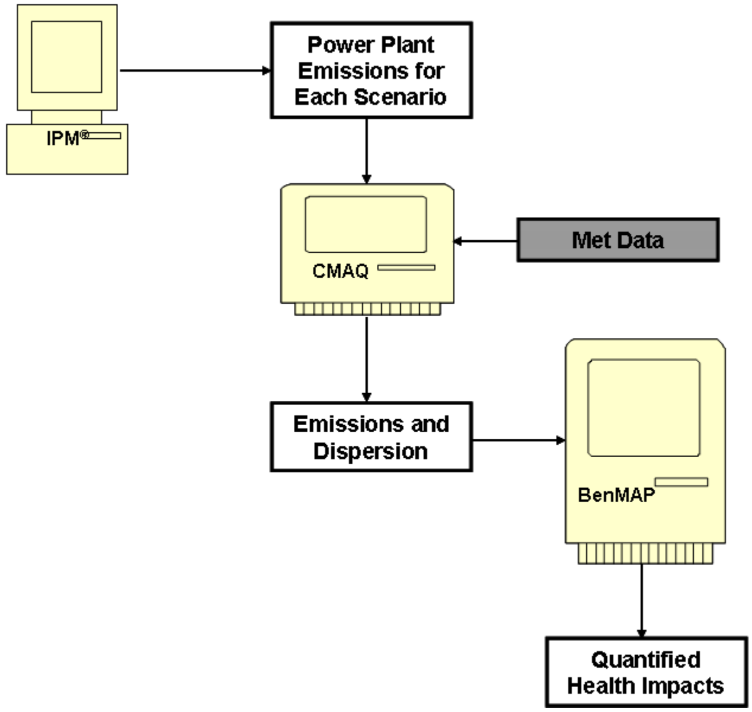
For each of the scenarios and the Reference Case the emissions from power plants in Delaware and other nearby regions are tracked so that changes in emissions between the scenario and

Reference Case can be determined. The primary pollutants of interest for this assessment are particulate matter (PM), ozone, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon dioxide (CO_2) and mercury (Hg).

i. Evaluation of Health Impacts of PM, Ozone, SO_2, and NO_2

The health impacts associated with PM, ozone, SO_2, and NO_2 are driven by the human inhalation of these pollutants in ambient air. Based on available health effects data, it was clear from the beginning that the health effects for human exposure to PM and ozone would be much higher than the health effects from exposure to SO_2 and NO_2 which are directly emitted from power plants and ozone which is a secondary pollutant formed in part by power plant emissions of nitrogen oxides (NO_x). As a result, our analysis of these pollutants focused on the health effects of PM and ozone exposure. To estimate impacts of PM and ozone on health and mortality (and the associated benefits of reductions in PM and ozone), changes in emissions had to be translated into changes in ambient air quality – primarily in terms of concentrations of $PM_{2.5}$ and ozone. $PM_{2.5}$ is directly emitted from coal, oil and gas-fired power plants and is also formed as a secondary product from the plant's emissions. Ozone is a secondary pollutant that is formed in the atmosphere by a series of reactions involving ultra violet (UV) radiation and precursor emissions of NO_x and volatile organic compounds (VOC). Therefore, it was necessary to account for the transport and dispersion of direct emissions of $PM_{2.5}$ as well as the chemical interactions that form secondary $PM_{2.5}$ and ozone.

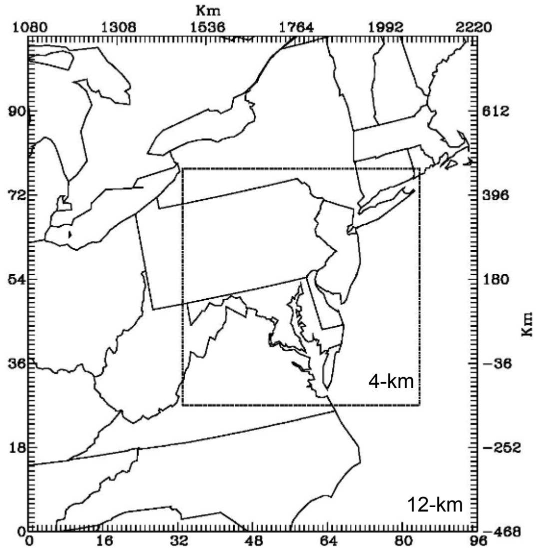
The IPM® modeling provided county-level emission estimates for Delaware of changes in emissions of SO_2, NO_x, and CO_2 from power plants that resulted from the different IRP scenarios. The IPM® emission estimates were used as input to an air quality model, EPA's Community Multiscale Air Quality (CMAQ) model, to calculate expected changes to ambient air quality for the pollutants of interest. Based on the CMAQ results, Delmarva/ICF then used EPA's Environmental Benefits Mapping and Analysis Program (BenMAP) program to estimate health and economic benefits for ozone and $PM_{2.5}$ and qualitative methods to estimate health and economic benefits for mercury. This approach is illustrated in the figure below.



BenMAP is a modeling system developed by EPA's Office of Air Quality Planning and Standards to estimate national and regional benefits of air quality health impacts. BenMAP is driven by estimates of $PM_{2.5}$ or ozone levels (based on air quality modeling) and provides estimates of changes in health impacts and associated costs. BenMAP includes population data at census tract level and algorithms for characterizing demographic changes (age distribution) over time through the year 2025.

BenMAP can estimate changes in a wide range of health impact "endpoints" (including mortality and morbidity) that might occur with changes in $PM_{2.5}$ exposure. Mortality endpoints include changes in "all-cause" mortality, as well as mortality due to specific causes, such as cardiovascular disease, cancer, and chronic pulmonary disease. Morbidity endpoints include specific illnesses and symptoms (for example, asthma exacerbations), events requiring medical care (emergency room visits and hospital admissions), and adverse effects that involve lost work or restricted activity days. For each scenario, health endpoints such as premature mortality, hospital admissions, chronic bronchitis, chronic asthma, acute bronchitis, induced asthma, and acute respiratory symptoms were summarized and reported (see Appendix 6).

This approach included several annual applications of the CMAQ model including a 2020 baseline simulation and several alternative emissions scenarios. Version 4.6 of the CMAQ model was used for this study. The model was applied using meteorological inputs for 2001 and for the 12-km resolution and 4-km resolution nested-grid modeling domain shown in the figure below.



Graphical and tabular summaries of the modeling results were prepared and the results were post-processed for input to the BenMAP tool. BenMAP was used to estimate the health impacts and economic benefits associated with the changes in air pollution simulated by CMAQ for each of the alternative emissions scenarios.

A full copy of the air quality and health impacts technical report is presented as Appendix 6.

ii. Evaluation of Health Impacts of CO_2 and Hg

CO_2 and Hg emission changes were not evaluated in the BenMAP model. Given the complexities and uncertainties associated with any characterization of climate change and its ultimate impacts, a different, less formal approach was used to capture the health effects of CO_2. A recent National Academy of Sciences (NAS) report[37] indicated a potential range of health impacts due to CO_2 emissions ranging from $1 to $100 per tonne. Delmarva decide to use a value of $30 tonne, the same value for CO_2 health impacts that was used in this NAS report.

For Hg, Delmarva/ICF estimated the overall changes in Hg emissions associated with different scenarios (based on outputs from IPM®) and qualitatively describe the potential impacts of these changes.

[37] The Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use, National Research Council of the National Academies, October 2009

C. Approach to Life-Cycle Analysis

Delmarva also worked with the Electric Power Research Institute (EPRI) and its subcontractors, Scientific Certification Systems (SCS), and Resource Systems Group Inc. (RSG), to perform life cycle assessments (LCAs) of the three IRP scenarios described above.

Life Cycle Assessment (LCA) is a quantitative, "cradle-to-grave" evaluation of the environmental and human health impacts of products, services and systems, including resource depletion, landscape disruption, loss of key species, environmental and human health impacts associated with emissions, and impacts from hazardous and radioactive wastes. The life cycle of a product, service or system is understood to include all processes associated with extraction of raw materials, processing of materials, transportation, energy inputs, production, use, distribution, recycling, waste treatment, and disposal. Under this systems analysis approach, comparisons between competing systems can be made on a functional equivalency basis.

The EPRI team used the lifecycle assessment framework described in the draft ANSI SCS-002 standard — Life-Cycle Stressor-Effects Assessment ("LCSEA") — to evaluate the environmental performance of proposed electric power generation systems in the scenario cases compared with the Reference Case on a comprehensive, technology-neutral and fuel-neutral basis. LCSEA, a LCA framework and set of impact assessment metrics developed in accordance with international LCA guidelines (ISO-14044), is a standardized and detailed life-cycle assessment technique that models the biophysical impact pathways (environmental impact mechanisms) for each reportable impact category by establishing and characterizing the relevant stressor-effects network. The phases of LCA required for comparative assertions under ISO-14044 include scoping, life cycle inventory, and life cycle impact assessment as shown in Table A.

Table A - Life Cycle Assessment Phases

Phase	***Description***
Scoping	• All discrete "unit processes" relevant to the product, service or system, and for any reference baseline used for comparison, are identified.

	• Assessment boundaries are delineated. • The functional unit to which results will be normalized is determined. • Relevant ("core") impact categories are determined.
Life cycle inventory	• Site or system-specific data are collected. • Relevant data from LCI databases are identified. • Data are entered into the LCI model. • Inputs and outputs for unit processes are calculated. • Landscape-level disruptions are identified.
Life cycle impact assessment	• Environmental characterization data are identified. • LCI results are characterized, then converted into category indicator results.

Category indictors included in the IRP life-cycle analysis are shown in Table B.

Table B – Impact Category Indicators

1. Extracted Resource Depletion
Energy Resource Depletion
2. Landscape Disturbance Level
Terrestrial Ecosystem Disturbance
Aquatic (Oceanic) Ecosystem Disturbance
Riparian/Wetland Ecosystem Disturbance
Loss of Key Species (% by species)
3. Climate Change Emissions
Global Climate Forcer Loading
Regional Climate Forcer Cooling
4. Environmental Effects Emissions
Ocean Acidification Loading
5. Human Health Effects Emissions
Auditory Exposure Over Threshold
Visual Impairment

The end results of the life-cycle evaluation are environmental performance declarations indicating the relative performance of each of the proposed scenarios among the key environmental performance areas shown in the table above.

As part of this study, Delmarva/EPRI and its subcontractors SCS/RSG also conducted regional baseline modeling using the RSG Time Managed Marginal (TMM) model. The TMM model used input from the IPM® model to determine total avoided greenhouse gas, NO_X, $PM_{2.5}$ and SO_X

emissions achieved from the insertion of the three scenarios into the Reliability First Corporation East (RFCE) North American Reliability Corporation (NERC) subregion.

A full copy of the environmental life-cycle assessment is presented as Technical Appendix 7.

3f. Renewable Energy Resources

An important focus of Delmarva's IRP is on the procurement of renewable energy for SOS customers. As described further, Delmarva's Reference Case procurement plan includes power purchase agreements for over 350 MW of renewable energy generation capacity that is coming into service between 2011 and 2020.

The State of Delaware requires that Delmarva purchase an increasing share of its energy from renewable sources as part of the enacted Renewable Portfolio Standard (RPS) legislation. To demonstrate compliance with the RPS legislation, Delmarva must provide Renewable Energy Credits (RECs) to the State. In general, one REC is created for every MWh generated by an eligible renewable energy resource.^^ There is also a requirement for a minimum percentage of RECs generated from solar photovoltaic resources. Table 1 below shows the minimum percentage of Delmarva customer's annual energy supply that must be supplied from renewable sources as amended by the Delaware General Assembly in June, 2010.[38]

Table 1 Delaware Eligible Renewable Energy Requirements

Compliance Year	Minimum Cumulative % from Eligible Energy Resources	Minimum Cumulative % from Eligible Solar Photovoltaics
2011	7.00%	0.20%
2012	8.50%	0.40%
2013	10.00%	0.60%
2014	11.50%	0.80%
2015	13.00%	1.00%
2016	14.50%	1.25%
2017	16.00%	1.50%
2018	17.50%	1.75%
2019	19.00%	2.00%
2020	20.00%	2.25%
2021	21.00%	2.50%
2022	22.00%	2.75%
2023	23.00%	3.00%
2024	24.00%	3.25%
2025	25.00%	3.50%

[38] 26 *Del.C.* § 354.

As Table 1 demonstrates, in 2011, the first plan year in this IRP, Delmarva is required to procure 7% of its energy requirements from renewable resources, including 0.2% from solar resources. By 2025, the percentage increases to 25%, with 3.5% from solar resources.

As a result of the IRP process, which has been ongoing in Delaware since 2006, Delmarva has already contracted for a portfolio of wind and solar resources to meet the renewable energy requirements for SOS customers as mandated by the Delaware RPS. The specific contracts are listed below in the order that they are expected to begin producing clean renewable energy for Delmarva's SOS customers:

1. AES Armenia Mountain: This 100 MW [nameplate capacity] wind project is located in Central Pennsylvania. Delmarva has entered into a power purchase agreement (PPA) with AES to purchase 50 MW of the wind energy and RECs from this project for Delmarva's SOS customers. This project has generated more than 110,000 MWH of renewable energy since becoming operational in late 2009.
2. Synergics Roth Rock: Delmarva entered into a PPA with Synergics to provide a wind farm located in Western Maryland of up to 40 MW [nameplate capacity]. The wind farm is currently under construction is expected to begin supplying energy and RECs by the end of 2010.
3. Synergics Eastern Wind: This wind project is also to be located in Western Maryland. Delmarva has a PPA with Synergics East Wind for wind energy and RECs from a facility of up to 60 MW [nameplate capacity].. This contract also calls for energy deliveries to begin by the end of 2010.
4. Dover Sun Park: Delmarva agreed to a 20 year contract to purchase 70% of the SRECs created by the 10 MW [nameplate capacity] Solar Park to be constructed in Dover by White Oak Solar Energy, LLC, an affiliate of LS Power. The Dover Sun Park is one of (if not the) largest solar installations in the Mid-Atlantic

region and is expected to be commercially operational by the Summer of 2011. Accompanying this contract, Delmarva signed an agreement with the Delaware Sustainable Energy Utility (SEU) which allows the SEU to purchase a portion of the SRECs generated by the Sun Park during its first two years of operation, for the purpose of preserving the life of excess SRECs. Under the terms of the SEU/Delmarva Power agreement, the SEU will return the preserved SRECs to Delmarva in later years when the RPS solar requirements are greater.

5. NRG Bluewater Wind: Delmarva entered into a contract with NRG Bluewater for wind energy, capacity and RECs from an offshore wind facility of up to 200MW. This project is in the planning and permitting stages and is expected to be located approximately 11 miles off-shore of Rehoboth Beach, Delaware. The costs of this contract will be shared by all of Delmarva's customers (not just the SOS customers).[39] The in-service deadline for this wind facility was recently extended by 2 years until May of 2016.

These five RPS eligible projects, when fully operational, represent a total of over 350 MW of nominal capacity with the potential to produce nearly 5 million MWHs through the end of 2020. This diverse portfolio of renewable energy resources establishes a strong foundation for the provision of environmental benefits for Delaware and Delmarva's SOS customers. Over the period 2011- 2020 these projects will create a renewable resource "supply stack" of RECs for meeting Delmarva's SOS customers' needs. Table 2 below shows how the expected renewable resources stack up over the planning period:

Table 2 Projection of RECs created by Existing Contracts for SOS Customers

[39] 26 *Del.C.* § 364.

	AES Armenia Mountain	Synergics Roth Rock	Synergics Eastern Wind	Blue Water Wind	Dover Sun Park	**Total Renewable Resources**
2011	122,000	122,000	184,000	0	2,846	430,846
2012	122,000	122,000	184,000	0	6,096	434,096
2013	122,000	122,000	184,000	0	9,747	437,747
2014	122,000	122,000	184,000	0	12,399	440,399
2015	122,000	122,000	184,000	0	13,150	441,150
2016	122,000	122,000	184,000	0	14,102	442,102
2017	122,000	122,000	184,000	303,184	9,554	740,738
2018	122,000	122,000	184,000	305,775	9,506	743,281
2019	122,000	122,000	184,000	308,971	9,459	746,430
2020	122,000	122,000	184,000	311,582	9,411	748,993

Table 2 indicates how Delmarva's portfolio of renewable energy resources is expected to grow over the planning period in step with the increasing requirements of the Delaware RPS legislation.

Table 3 below shows how Delmarva's "supply stack" of wind resources is currently expected to match up with the non-solar RPS requirements over the ten year planning period. As shown in Table 3, current commitments are expected to create more than enough RECs to supply SOS customer RPS requirements in all years except 2015and 2016. As explained below, however, the RECS created and banked in previous years should be sufficient to cover the shortfalls. The specific results of Table 3 depend on the expected load forecast, the expected level of energy efficiency and conservation savings to be achieved, the construction schedules of the wind resources, actual renewable resource performance, and any potential changes to the Delaware RPS.

Table 3 Estimated REC Requirements and Contracted Supply

	Projected Total REC Requirements *	Projected Contracted Supply	Projected REC Surplus/ (Shortfall)
2011	247,475	428,000	180,525
2012	296,260	428,000	131,740
2013	343,377	428,000	84,623
2014	388,684	428,000	39,316
2015	437,065	428,000	-9,065
2016	489,863	428,000	-61,863
2017	539,830	731,184	191,354
2018	585,484	733,775	148,291
2019	629,986	736,971	106,985
2020	697,125	739,582	42,457

* Reduced by the solar carve-out and by the 1% allowance for RECs from "existing" resources through 2019.

In any year where there is an expected oversupply of RECs, Delmarva is allowed to "bank" the excess RECs for use in any of the following three years. Delmarva can also sell any extra RECs and credit the proceeds to SOS customers. For example, Delmarva could cover the negative balance shown in 2015 and 2106 with the inventory of RECs created in the three prior years. Consequently as can be seen from Table 3, the wind resource commitments already executed by Delmarva and incorporated as part of the Reference Case are expected to more than satisfy the non-solar Delaware RPS requirements through the planning period.

Table 4 below shows the expected situation over the planning period for the acquisition of RECs created by eligible solar resources (SRECs).

Table 4 Estimated SREC Requirements and Contracted Supply

	Projected Solar REC Requirement	Projected Contracted Supply *	Projected SREC Surplus/ (Shortfall)
2011	8,533	2,846	-5,688
2012	16,690	6,096	-10,594
2013	24,526	9,747	-14,779
2014	32,056	12,399	-19,657
2015	39,732	13,150	-26,582
2016	49,985	14,102	-35,883
2017	59,981	9,554	-50,427
2018	69,463	9,506	-59,957
2019	78,747	9,459	-69,288
2020	88,367	9,411	-78,956

*Includes Dover Solar Park and the Delaware SEU SREC banking contract.

At this time, as can be seen from Table 4 above, Delmarva is currently "short" on its procurement of SRECs for SOS customers. Delmarva is participating in the Renewable Energy Task Force established under the RPS legislation enacted in 2010. This Task Force is expected to make recommendations to the DNREC Secretary about the establishment of trading mechanisms and other structures to support the growth of renewable energy markets in Delaware. Delmarva anticipates the Task Force's recommendation will include mechanism for the SEU to secure SRECs for resale to suppliers within the state (including Delmarva). After reviewing these recommendations, Delmarva will submit to the Commission a revised plan for securing SRECs to supply Delmarva's SOS customers. If this contemplated supply does not materialize, Delmarva has contractual rights to recall SRECs committed to the SEU (7,500 SRECs in 2011 and 3,700 SRECs in 2012) to meet its obligation to SOS customers.

As discussed above, the IRP Reference Case includes Delmarva's existing power purchase agreements with wind and solar energy developers for over 350 MW of nominal renewable resource capacity. Two of the scenarios evaluated later in this IRP examine the impact of adding an additional 150 MW of either land-based or off-shore wind resources.

Contingency Plan

The plan to acquire renewable resources to meet the needs of Delmarva's SOS customers as presented in this IRP is dependent to a large degree upon the timely construction, operation and delivery of energy and RECs from the wind and solar resources with which Delmarva has executed Power Purchase Agreements (PPAs). Consequently, a major risk to the plan to secure renewable energy is that any of the expected operational starting dates for the facilities could be significantly delayed. Given that some of the wind projects included in the Reference Case have already experienced construction or start–up delays, this is a genuine risk to the plan. However, Delmarva currently has a sufficient supply of RECs to meet its non-solar requirements in the near term. If Delmarva were to become "short" on RECs, it could use RECs that have already been banked or purchase RECs from the market as appropriate.

If any of the renewable energy projects fails to come to fruition, Delmarva would have several options. These options include issuing a new RFP for qualifying resources[40], considering other reasonably priced sources where appropriate and beneficial to customers, or other appropriate action. In any event, the market for renewable projects and RECs changes over time. Should Delmarva need to seek additional REC supplies due to a failure of one of its contracted projects, it would be necessary to evaluate the market and expected SOS customer needs at the time of the contract default to determine the most appropriate action. Delmarva is required to submit an IRP every 2 years, allowing interested parties and stakeholders to review changes to Delmarva's IRP.

Finally, it is important to understand that the planning and actual acquisition of renewables is not a process that takes place only once every two years through the development of an IRP. Delmarva employees experienced in the energy and REC markets work every day to acquire both energy and RECs to meet the needs of Delmarva's customers at the lowest reasonable cost.

[40] Any contract obtained through an RFP process would need Commission approval prior to implementation. 26 *Del. C.* §1007(b).

4. Reference Case and Scenario Case Comparisons and Results

In preparing the IRP, Delmarva uses the concept of a "Reference Case" to provide a structure for the analysis and evaluations that are needed. The Reference Case represents Delmarva's expected view of the future procurement planning environment from 2011 - 2020. Importantly, the Reference Case provides a point of comparison for the evaluation of other potential procurement scenarios.

The IRP Reference Case provides a dynamic view of the expected 2011 – 2020 future state of the electric system within Delaware and PJM. The Reference Case also reflects the energy legislation enacted by the Delaware General Assembly since the last IRP was filed in November, 2008, the expected activities of the SEU, expected Federal environmental regulations, and the Commission approved renewable power purchase agreements discussed in Section 3f of this IRP[41].

The Reference Case provided in this IRP provides a detailed look at the results of Delmarva's expected future energy procurement practices for the period 2011 – 2020. The key data planning assumptions underlying the view of Delmarva's energy future implied by the Reference Case include the following:

1. The Delmarva load forecast (described in Section 3a and Appendix 3);
2. The energy and demand reduction targets described by the Energy Efficiency Act of 2009 (described in Section 3b);
3. Various PJM approved transmission system upgrades including the MAPP project (described in Section 3c);
4. The cost and operating characteristics of supply side resource options (described in Section 3d and Appendix 4);

[41] These include the approved purchase agreements with Bluewater Wind, AES, Synergics, and the Dover Solar Park.

5. Delmarva's plan to procure REC's generated by renewable energy resources in sufficient quantity to meet the annual requirements of the prevailing Delaware Renewable Portfolio Standards (described in Section 3f); and,
6. The expected implementation and timing of various environmental regulations affecting power generation. These assumptions are described in Appendix 4[42].

In addition to preparing the Reference Case, Delmarva also analyzed three scenarios. In each scenario case described below, all assumptions remain the same as in the Reference Case except for the resource acquisitions noted:

- Scenario Case No. 1: Delmarva procures an additional 150 MW of offshore wind resources located on the Delaware Coast beginning in 2016.

- Scenario Case No 2: Delmarva procures an additional 150 MW of land based wind resources located in Pennsylvania beginning in 2014.

- Scenario Case No 3: Delmarva procures 135 MW of a gas fired combined cycle generation resource located in Southern Delaware beginning in 2014.

The remainder of this section presents detailed information for the Reference Case and the Scenario Cases. Information is presented based on the IPM® results, the Portfolio Model results, Environmental Benefits evaluation and Life Cycle Analysis.

1. IPM® Results

The IPM® model provides detailed information about the expected state of electric power generation over the planning period including, planned generation expansion, generation output, and power plant emissions. A more technical description of IPM® is provided in Appendix 4.

[42] Later in this Section of the IRP, Delmarva describes a "Boundary Case" which examines the effects of a less restrictive regime of environmental regulation.

Based on the IPM® analysis, Table 1 below shows the expected generation capacity by generation type in PJM under the Reference Case assumptions for the years 2011- 2020.

Table 1 Reference Case: PJM Total Installed Capacity (MW)

Type	2011	2012	2014	2016	2018	2020
Coal	81,192	80,904	75,447	74,684	65,599	65,592
Gas - CC	22,295	22,295	28,236	33,362	38,960	39,620
Gas - CT	31,446	31,445	31,205	31,205	33,286	34,365
Gas - Cogen	3,000	3,000	2,255	1,492	1,492	1,027
Nuclear	33,620	33,648	33,648	33,648	33,648	33,648
Oil/gas	7,187	6,374	8,454	8,578	8,578	8,578
Renewable - Onshore Wind	5,680	8,493	9,997	9,997	9,997	11,953
Renewable - Offshore Wind	-	-	-	200	200	1,300
Renewable - PV	265	427	1,246	2,475	2,507	3,229
Renewable - Biomass	477	477	826	1,936	2,990	4,140
Renewable - Hydro	2,312	2,312	2,437	2,437	2,437	2,437
Renewable - Pumped Storage	4,966	4,966	4,966	4,966	4,966	4,966
Renewable - LFG	532	532	648	1,137	1,633	1,956
Other	541	541	541	541	541	541
Total MW Capacity	193,513	195,414	199,906	206,658	206,834	213,352

Table 1 indicates that while the overall installed generation capacity in PJM is expected to increase by almost 20 GW from 2011- 2020, the change in the installed generation capacity by type of generation varies greatly. The amount of installed generation capacity for coal is expected to decline by over 15 GW while the installed capacity of gas fired combined cycle (CC) technology increases over 17 GW. Land based wind generation capacity also increases by over 6 GW. The off-shore wind capacity in 2020 includes 200 MW for the Delaware NRG Bluewater project and 1,100 MW of off-shore wind located in New Jersey[43].

Of the new generation capacity suggested by IPM® in Table 1, only a small portion of land fill gas and land based wind are expected to be located in Delaware.

[43] The New Jersey Offshore Wind Development Act created an offshore wind renewable energy certificate program to support at least 1,100 MW of generation from qualified offshore wind projects.

Corresponding to the PJM installed capacity illustrated in Table 1, Table 2 provides the expected annual energy by generation resource type for 2011 – 2020.

Table 2 Reference Case: PJM Generation (GWh) by Resource Type

Type	2011	2012	2014	2016	2018	2020
Coal	470,136	476,214	468,224	481,219	441,183	446,176
Gas - CC	78,792	90,408	113,583	132,829	187,317	184,507
Gas - CT	4,067	5,365	4,801	3,429	5,264	5,510
Gas - Cogen	18,725	19,926	13,579	8,275	9,275	6,317
Nuclear	261,447	255,706	260,207	257,945	254,864	260,094
Oil/gas	3,993	5,236	2,553	680	694	4
Renewable - Onshore Wind	14,480	22,855	27,166	27,166	27,166	32,749
Renewable - Offshore Wind	-	-	-	288	558	3,861
Renewable - PV	439	717	1,996	3,960	4,029	5,169
Renewable - Biomass	3,775	3,775	6,439	14,903	22,976	31,766
Renewable - Hydro	7,417	7,417	7,739	7,739	7,739	7,739
Renewable - Pumped Storage	8,604	8,604	8,604	8,369	7,361	7,459
Renewable - LFG	3,747	3,759	4,706	8,694	12,736	15,370
Other	4,279	4,279	4,279	4,279	4,279	4,279
Total Annual Generation	879,901	904,261	923,876	959,775	985,441	1,011,000

Total generation in PJM is expected to increase about 130,000 GWh over the planning period. Most of this increase comes from gas fired combined cycle generation (over 105,000 GWh) and land based wind (over 18 GWh).

An attractive feature of the IPM® is that in preparing these generation forecasts, the model is able to keep track of power plant emissions. IPM® is able to track carbon dioxide (CO_2), sulfur dioxide (SO_2), nitrous oxide (NO_X) and mercury (Hg) emissions associated with the Reference Case and each of the Scenario Cases. As discussed in Section 3e and Technical Appendix 6, the changes in power plant emissions between the Reference Case and the individual Scenario cases form the basis for the evaluation of environmental benefits.

Table 3 and Table 4 below show the expected total emissions for the Reference Case for both PJM and the State of Delaware based on the IPM®.

Table 3 Reference Case: PJM Power Plant Emissions

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,187.9	536,198.0	532,813.4	552,703.7	535,097.4	537,531.3
SO_2 (1000 tons)	2,221.3	1,561.3	776.6	707.3	484.7	520.9
NO_x (1000 tons)	403.4	398.9	372.1	388.7	335.7	331.0
Hg (tons)	5.5	5.3	4.4	2.9	2.2	2.2

Table 4 Reference Case: Delaware Power Plant Emissions

Type	2011	2012	2014	2016	2018	2020
CO2 (1000 tons)	4,260.1	4,420.7	3,487.4	3,146.6	3,314.2	3,275.9
SO2 (1000 tons)	23.8	9.0	2.0	2.1	2.0	2.1
NOx (1000 tons)	4.4	2.9	1.8	1.7	1.6	1.6
Hg (tons)	0.02	0.02	0.01	0.01	0.01	0.01

As indicated in Table 3, the total amount of SO_2, NO_X, and Hg emissions created by power plants in PJM are expected to decrease significantly by 2020 in the Reference Case. The total amount of CO_2 in PJM increases by about 3% over the IRP planning period in the Reference Case. Table 4 indicates that, in Delaware, the total amount of emissions from each power plant, including CO_2, is expected to drop significantly over the IRP planning period in the Reference Case.

Tables 5 and 6 below provide a comparison of the expected generation by year by resource type for the Reference Case and the three scenario cases for Delaware and PJM respectively:

Table 5 Delaware Generation by Resource Type (GWh)

Reference Case

Type	2012	2014	2016	2018	2020
Coal	2,557	2,056	2,095	2,189	2,261
Gas - CC	3,774	3,171	2,362	2,425	2,307
Gas - CT	123	93	53	77	87
Gas - Cogen	-	-	-	-	-
Nuclear	-	-	-	-	-
Oil/gas	144	-	-	95	-
Renewable - Onshore Wind	-	-	-	-	23
Renewable - Offshore Wind	-	-	288	558	558
Renewable - PV	-	-	-	-	-
Renewable - Biomass	-	-	-	-	-
Renewable - Hydro	-	-	-	-	-
Renewable - Pumped Storage	-	-	-	-	-
Renewable - LFG	49	49	193	193	389
Other	-	-	-	-	-
Total annual generation GWh	6,647	5,370	4,991	5,538	5,625

Scenario Case No 1: Additional Offshore Wind

Type	2012	2014	2016	2018	2020
Coal	2,557	2,056	2,095	2,189	2,261
Gas - CC	3,774	3,174	2,356	2,427	2,307
Gas - CT	123	93	53	77	87
Gas - Cogen	-	-	-	-	-
Nuclear	-	-	-	-	-
Oil/gas	144	-	-	43	-
Renewable - Onshore Wind	-	-	-	-	23
Renewable - Offshore Wind	-	-	505	978	978
Renewable - PV	-	-	-	-	-
Renewable - Biomass	-	-	-	-	-
Renewable - Hydro	-	-	-	-	-
Renewable - Pumped Storage	-	-	-	-	-
Renewable - LFG	49	49	193	193	389
Other	-	-	-	-	-
Total Annual Generation GWh	6,647	5,373	5,202	5,907	6,044

Scenario Case No 2: Additional Land Based Wind

Type	2012	2014	2016	2018	2020
Coal	2,556	2,056	2,095	2,189	2,261
Gas - CC	3,774	3,171	2,360	2,482	2,304
Gas - CT	123	93	53	77	87
Gas - Cogen	-	-	-	-	-
Nuclear	-	-	-	-	-
Oil/gas	144	-	-	95	-
Renewable - Onshore Wind	-	-	-	-	23
Renewable - Offshore Wind	-	-	288	558	558
Renewable - PV	-	-	-	-	-
Renewable - Biomass	-	-	-	-	-
Renewable - Hydro	-	-	-	-	-
Renewable - Pumped Storage	-	-	-	-	-
Renewable - LFG	49	49	193	193	389
Other	-	-	-	-	-
Total Annual Generation GWh	6,646	5,370	4,990	5,595	5,622

Scenario Case No 3: Additional CC

Type	2012	2014	2016	2018	2020
Coal	2,557	2,056	2,095	2,189	2,261
Gas - CC	3,774	3,335	2,610	2,638	2,413
Gas - CT	123	93	53	76	81
Gas - Cogen	-	-	-	-	-
Nuclear	-	-	-	-	-
Oil/gas	144	-	-	13	-
Renewable - Onshore Wind	-	-	-	-	23
Renewable - Offshore Wind	-	-	288	558	558
Renewable - PV	-	-	-	-	-
Renewable - Biomass	-	-	-	-	-
Renewable - Hydro	-	-	-	-	-
Renewable - Pumped Storage	-	-	-	-	-
Renewable - LFG	49	49	193	193	389
Other	-	-	-	-	-
Total Annual Generation GWh	6,647	5,534	5,240	5,668	5,724

Table 6 PJM Generation (GWh) by Resource Type

Reference Case

Type	2011	2012	2014	2016	2018	2020
Coal	470,136	476,214	468,224	481,219	441,183	446,176
Gas - CC	78,792	90,408	113,583	132,829	187,317	184,507
Gas - CT	4,067	5,365	4,801	3,429	5,264	5,510
Gas - Cogen	18,725	19,926	13,579	8,275	9,275	6,317
Nuclear	261,447	255,706	260,207	257,945	254,864	260,094
Oil/gas	3,993	5,236	2,553	680	694	4
Renewable - Onshore Wind	14,480	22,855	27,166	27,166	27,166	32,749
Renewable - Offshore Wind	-	-	-	288	558	3,861
Renewable - PV	439	717	1,996	3,960	4,029	5,169
Renewable - Biomass	3,775	3,775	6,439	14,903	22,976	31,766
Renewable - Hydro	7,417	7,417	7,739	7,739	7,739	7,739
Renewable - Pumped Storage	8,604	8,604	8,604	8,369	7,361	7,459
Renewable - LFG	3,747	3,759	4,706	8,694	12,736	15,370
Other	4,279	4,279	4,279	4,279	4,279	4,279
Total Annual Generation	879,901	904,261	923,876	959,775	985,441	1,011,000

Scenario Case No 1: Additional Off Shore Wind

Type	2011	2012	2014	2016	2018	2020
Coal	470,142	476,237	468,176	481,263	441,210	446,232
Gas - CC	78,788	90,440	113,714	132,962	187,348	184,135
Gas - CT	4,066	5,381	4,812	3,439	5,269	5,516
Gas - Cogen	18,725	19,926	13,580	8,284	9,215	6,317
Nuclear	261,447	255,706	260,207	257,945	254,864	260,094
Oil/gas	3,993	5,237	2,549	684	620	4
Renewable - Onshore Wind	14,475	22,657	26,659	26,659	26,659	32,749
Renewable - Offshore Wind	-	-	-	505	978	4,281
Renewable - PV	439	717	1,996	3,960	4,029	5,169
Renewable - Biomass	3,775	3,775	6,430	14,877	22,950	31,740
Renewable - Hydro	7,417	7,417	7,739	7,739	7,739	7,739
Renewable - Pumped Storage	8,604	8,604	8,604	8,367	7,356	7,460
Renewable - LFG	3,747	3,759	4,678	8,694	12,708	15,370
Other	4,279	4,279	4,279	4,279	4,279	4,279
Total Annual Generation GWh	879,897	904,135	923,423	959,657	985,224	1,011,085

Scenario Case No 2: Additional Land Based Wind

Type	2011	2012	2014	2016	2018	2020
Coal	470,159	476,238	468,171	481,259	441,203	446,187
Gas - CC	78,787	90,510	113,461	133,192	187,261	184,247
Gas - CT	4,066	5,397	4,817	3,430	5,302	5,517
Gas - Cogen	18,724	19,926	13,585	8,417	9,357	6,317
Nuclear	261,447	255,706	260,207	257,945	254,864	260,094
Oil/gas	3,993	5,237	2,553	737	686	4
Renewable - Onshore Wind	14,476	22,505	26,880	26,880	26,880	33,202
Renewable - Offshore Wind	-	-	-	288	558	3,861
Renewable - PV	439	717	1,996	3,960	4,029	5,169
Renewable - Biomass	3,775	3,775	6,430	14,877	22,950	31,740
Renewable - Hydro	7,417	7,417	7,739	7,739	7,739	7,739
Renewable - Pumped Storage	8,604	8,604	8,604	8,378	7,367	7,460
Renewable - LFG	3,747	3,759	4,703	8,694	12,733	15,370
Other	4,279	4,279	4,279	4,279	4,279	4,279
Total Annual Generation GWh	879,913	904,070	923,425	960,075	985,208	1,011,186

Scenario Case No 3: Additional CC

Type	2011	2012	2014	2016	2018	2020
Coal	470,134	476,211	468,183	481,214	441,161	446,241
Gas - CC	78,789	90,396	114,026	132,775	187,433	184,569
Gas - CT	4,066	5,360	4,780	3,441	5,259	5,479
Gas - Cogen	18,725	19,926	13,398	8,415	9,441	6,317
Nuclear	261,447	255,706	260,207	257,945	254,864	260,094
Oil/gas	3,994	5,236	2,553	679	587	4
Renewable - Onshore Wind	14,499	22,908	27,240	27,240	27,240	32,749
Renewable - Offshore Wind	-	-	-	288	558	3,861
Renewable - PV	439	717	1,996	3,960	4,029	5,169
Renewable - Biomass	3,775	3,775	6,439	14,911	22,984	31,774
Renewable - Hydro	7,417	7,417	7,739	7,739	7,739	7,739
Renewable - Pumped Storage	8,604	8,604	8,604	8,378	7,377	7,459
Renewable - LFG	3,747	3,759	4,514	8,557	12,545	15,370
Other	4,279	4,279	4,279	4,279	4,279	4,279
Total Annual Generation GWh	879,915	904,294	923,958	959,821	985,496	1,011,104

The data depicted in Tables 5 and 6 suggest several important themes. First, the amount of resources that are added in each of the scenarios is small relative to the overall size of PJM. Consequently, it is unlikely that any of these scenarios will have large effects on the system as a whole. Second, comparing the results for Scenario Case No. 1 (the additional off-shore wind case) with the Reference Case suggests that there is little effect on the total amount of fossil generation occurring in Delaware in 2020 by the inclusion of the additional off-shore wind resources. This is the same result when comparing Scenario Case No. 2 (the additional land-based wind case) with the Reference Case. This suggests that for these two cases that the additional intermittent wind generation is occurring in time periods when the fossil units in Delaware are not "on the margin". Consequently, the emissions reduction effects of the additional wind resources will be generally occurring outside of Delaware.

Based on the IPM® analysis, Tables 7 and 8 show the power plant emissions by type for Delaware and PJM for the Reference Case and the three scenario cases, respectively.

Table 7 Delaware Annual Power Plant Emissions

Reference Case

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	4,260.1	4,420.7	3,487.4	3,146.6	3,314.2	3,275.9
SO_2 (1000 tons)	23.8	9.0	2.0	2.1	2.0	2.1
NOx (1000 tons)	4.4	2.9	1.8	1.7	1.6	1.6
Hg (tons)	0.02	0.02	0.01	0.01	0.01	0.01

Scenario Case No 1: Additional Off Shore Wind

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	4,260.1	4,420.7	3,489.0	3,144.0	3,282.8	3,275.6
SO_2 (1000 tons)	23.8	9.0	2.0	2.1	2.0	2.1
NO_x (1000 tons)	4.4	2.9	1.8	1.7	1.6	1.6
Hg (tons)	0.02	0.02	0.01	0.01	0.01	0.01

Scenario Case No 2: Additional Land Based Wind

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	4,260.1	4,420.0	3,487.6	3,146.0	3,339.5	3,274.6
SO_2 (1000 tons)	23.8	9.0	2.0	2.1	2.0	2.1
NO_x (1000 tons)	4.4	2.9	1.8	1.7	1.6	1.6
Hg (tons)	0.02	0.02	0.01	0.01	0.01	0.01

Scenario Case No 3: Additional CC

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	4,260.1	4,420.7	3,567.1	3,263.6	3,363.4	3,324.0
SO_2 (1000 tons)	23.8	9.0	2.0	2.1	2.0	2.1
NO_x (1000 tons)	4.4	2.9	1.8	1.7	1.6	1.6
Hg (tons)	0.02	0.02	0.01	0.01	0.01	0.01

Table 8 PJM Power Plant Emissions

Reference Case

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,187.9	536,198.0	532,813.4	552,703.7	535,097.4	537,531.3
SO_2 (1000 tons)	2,221.3	1,561.3	776.6	707.3	484.7	520.9
NO_x (1000 tons)	403.4	398.9	372.1	388.7	335.7	331.0
Hg (tons)	5.5	5.3	4.4	2.9	2.2	2.2

Scenario Case No 1: Additional Off Shore Wind

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,192.0	536,241.6	532,822.4	552,811.0	535,066.3	537,443.7
SO_2 (1000 tons)	2,190.3	1,561.2	776.7	702.5	491.3	518.7
NO_x (1000 tons)	403.5	398.9	372.1	388.7	335.7	331.0
Hg (tons)	5.5	5.3	4.4	3.0	2.2	2.2

Scenario Case No 2: Additional Land Based Wind

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,210.1	536,293.6	532,720.0	552,982.4	535,147.3	537,446.5
SO_2 (1000 tons)	2,150.7	1,561.3	776.7	701.2	486.8	515.9
NO_x (1000 tons)	403.5	398.9	372.1	388.8	335.7	331.0
Hg (tons)	5.5	5.3	4.4	3.0	2.2	2.2

Scenario Case No 3: Additional CC

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,182.6	536,185.3	532,875.1	552,761.2	535,139.8	537,609.8
SO_2 (1000 tons)	2,199.0	1,561.0	776.7	707.1	492.1	518.2
NO_x (1000 tons)	403.4	398.9	372.1	388.7	335.7	331.0
Hg (tons)	5.5	5.3	4.4	3.0	2.2	2.2

The changes in emissions between the Scenario Cases and the Reference case are a principal input into the evaluation of environmental benefits. In this IRP, Delmarva also estimated the potential range of environmental benefits based on the reductions in emissions expected to occur in the Reference Case between 2010 and 2020.

Assumptions regarding the implementation and timing of future environmental regulations affecting power generation are important inputs in preparing the Reference and Scenario cases. These assumptions are shown in the Tables 9 and 10 below:

Table 9 Key Environmental Regulation Assumptions in Delaware

Regulation	Pollutant	Permitted Levels	Criteria	Enactment	Source
Title 7 DNREC section 1146	NO_x	2009: 0.15 lb/MMBtu 2012: 0.125 lb/mmbtu; annual unit level tonnage limits	Affects Indian River (NRG), Edge Moor (Calpine), McKeen Run (one unit) (city of Dover)	11/16/2006	http://www.awm.delaware.gov/info/regs/Pages/aqmmultipreg.aspx
	SO_2	2009: 0.37 lb/MMBtu 2012: 0.26 lb/mmbtu; annual unit level tonnage limits			
	Hg	Unit-level regulation: Phase 1 (2009): 80% capture or rate limit of 1.0 lb/TBtu; Phase 2 (2013): 90% capture or rate limit of 0.6 lb/TBtu			
RGGI (Regulation # 1147) [1]	CO_2	approx.10% reduction from current levels by 2019	All generators > 25 MW	2008	http://www.awm.delaware.gov/Info/Regs/Pages/RGGI.aspx
SB 119	Renewables	25% by 2025, including 2.005% solar	eligible renewable technologies	7/10/2010	http://legis.delaware.gov/LIS/lis145.nsf/vwLegislation/SS+1+for+SB+119/$file/4161450004.doc?open

1. RGGI is a regional program with state level implementation and allowance allocations. The Delaware plan under RGGI is shown above.

Table 10

Key Environmental Regulation Assumptions Affecting Multiple Market Areas

	SO2 Programs	NOX Programs		Hazardous Air Pollutants (HAPs) Program	CO2 Program
		Annual	Ozone Season		
CAIR for SO2 and NOX (2010-2011)	25 States + DC Retirement ratio: 2:1 Existing Title IV for unaffected	25 States + DC 1.522 million tons	25 States + DC 0.568 million tons	2015: Federal MACT standards similar to those for coal-fueled units in EPA's Industrial Boiler MACT program Units must be controlled with scrubber, fabric filter and ACI to continue operation Regulatory Relief: Units excused from compliance with HAPs if commit to retirement by 2018 States with existing Hg rules proceed as planned, so long as they meet minimum requirement as defined by federal MACT	2018: National Multi-sector Cap and Trade Sectoral coverage 2018: Electric power and transportation sectors 2023: Industrial sector 3% below 2005 levels for covered sectors in 2018; 83% below in 2050 Domestic and international offsets based on ICF's projections
Clean Air Transport Rule (CATR) for SO2 and NOX (2012 onward)	28 States and DC State emission budgets, with in-state and limited interstate trading in each of 2 groups Group 1 2012: 3.1 MMTons 2014: 1.7 MMTons Group 2 2012: 0.776 MMTons Existing Title IV for unaffected states	28 States and DC State emission budgets, with in-state and limited interstate trading 2012: 1.376 MMTons	26 States and DC State emission budgets, with in-state and limited interstate trading 2012: 0.642 MMTons		

To evaluate the relative significance of the environmental assumptions of the Reference Case in affecting air quality in Delaware, Delmarva evaluated a "Boundary Case" in which many of the future environmental regulatory requirements assumed in the Reference Case were postponed to a later timeframe within or beyond the 10 year planning horizon. The environmental regulations in the Boundary Case differ from the Reference Case as follows:

- CO_2: Federal regulation is postponed from 2018 to 2020
- HAPs: Regulatory relief is extended through 2020 from 2018
- Water: Rules extended to 2018. Variable Speed Cooling Tower Pump (VSP) and screens minimum requirement on units with once-through cooling systems located on brackish waters versus cooling towers required on all units with once through cooling systems.
- Coal Combustion Byproducts (CCB): Rules extended to 2018 from 2015

Tables 11 and 12 below illustrate some of the major changes in the results of the Boundary Case relative to the Reference Case. Table 11 shows the expected impact on power plant emissions and Table 12 shows the expected impact on energy prices between the Boundary and Reference Cases.

Table 11 Comparison of Total PJM Power Emissions Plant Emissions

PJM Annual Emissions

Boundary Case

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	522,737.3	535,645.4	538,022.0	589,783.5	606,877.8	593,228.7
SO_2 (1000 tons)	2,168.7	1,557.0	772.9	712.9	742.1	563.9
NO_x (1000 tons)	403.3	399.3	387.0	402.1	408.5	374.0
Hg (tons)	5.5	5.3	4.5	3.1	3.2	2.7

PJM Annual Emissions

Reference Case

Type	2011	2012	2014	2016	2018	2020
CO_2 (1000 tons)	523,187.9	536,198.0	532,813.4	552,703.7	535,097.4	537,531.3
SO_2 (1000 tons)	2,221.3	1,561.3	776.6	707.3	484.7	520.9
NO_x (1000 tons)	403.4	398.9	372.1	388.7	335.7	331.0
Hg (tons)	5.5	5.3	4.4	2.9	2.2	2.2

Table 11 indicates the expected increases in emissions (i.e., CO_2, SO_2, NOx, and Hg) by 2020 relative to their expected levels in the Reference Case. That is, the boundary level conditions for annual CO_2, SO_2, NO_x and Hg emissions are expected to increase by about 10%, 8%, 13% and 28%, respectively. Additionally, the expected annual emission levels for SO2, NOX, and Hg in the Boundary Case are lower in 2020 than in 2010.

Table 12 Comparison of Expected Energy Prices

Confidential Material Omitted

All-Hours (2009$/MWh)

Boundary Case

Region	2011	2012	2014	2016	2018	2020
DPL North			53.71	48.05	52.80	58.64
DPL South			55.29	47.89	52.53	58.88
PJM West			46.61	42.06	46.61	55.11

All-Hours (2009$/MWh)

Reference Case

Region	2011	2012	2014	2016	2018	2020
DPL North			52.75	49.95	65.61	71.24
DPL South			54.42	49.68	65.56	71.05
PJM West			45.58	45.26	62.56	68.10

Table 12 shows the expected all-hours[44] energy prices for the Boundary and Reference Cases for the DPL zone and PJM West. These prices do not differ significantly until 2016. After 2016, energy prices for the Boundary Case remain considerably lower than in the Reference Case.

2. Portfolio Model Results

[44] All-hours includes both peak and off-peak hours.

In order to evaluate expected energy prices and price stability Delmarva uses a Portfolio Model with inputs from IPM®. Based upon market volatility, the Portfolio model simulates 1,000 possible price outcomes per year for Delmarva's expected portfolio of full service and renewable energy projects for SOS customers over the planning period.

Based on the results of the Portfolio Model, Table 13 below shows the expected mean energy prices in real dollars ($2010) for Residential and Small Commercial (RSCI) and Large Commercial (LC) SOS customers for the Reference Case compared with the Scenario cases for selected planning years.

Table 13 Expected Energy Prices in $2010 RSCI and LC SOS Customers

CONFIDENTIAL MATERIAL OMITTED

Planning Year Scenario	SOS RSCI		SOS LC	
	Total Average Costs ($/MWh)	**Delta (%)**	**Total Average Costs ($/MWh)**	**Delta (%)**
Settlement Period: Planning Year 2011				
Reference Case				
Settlement Period: Planning Year 2013				
Reference Case				
Settlement Period: Planning Year 2015				
Reference Case	$96.41		$86.92	
Reference Case and CC South	$97.72	**1.4%**	$88.22	**1.5%**
Reference Case with Wind (Land Based)	$98.21	**1.9%**	$88.71	**2.1%**
Settlement Period: Planning Year 2017				
Reference Case	$114.50		$102.26	
Reference Case and CC South	$114.62	**0.1%**	$102.38	**0.1%**
Reference Case with Wind (Land-Based)	$116.06	**1.4%**	$103.84	**1.5%**
Reference Case with Wind (Off-Shore)	$120.00	**4.8%**	$107.84	**5.5%**
Settlement Period: Planning Year 2020				
Reference Case	$127.64		$119.09	
Reference Case and CC South	$126.37	**-1.0%**	$117.82	**-1.1%**
Reference Case with Wind (Land-Based)	$126.98	**-0.5%**	$118.43	**-0.6%**
Reference Case with Wind (Off-Shore)	$131.75	**3.2%**	$123.20	**3.5%**

Table 13 indicates that, for the Reference Case, energy supply prices are expected to rise over the planning period 2011-2020 for both RSCI and LC SOS customers. {Confidential Material Deleted}

A primary reason for this expected increase in energy prices is the implementation of stricter Federal environmental regulations for fossil fired generation resources[45]. Within this Table, the price performance of the alternative cases relative to each other and the Reference Case varies over time.

Importantly, the results for the off-shore wind scenario shown in Table 13 assume the current contract prices for the Bluewater Wind Project for the additional off-shore wind purchase. Likewise, the results for the land-based wind case assume contract prices similar to Delmarva's existing land-based wind contracts. The results in Table 13 do not include the effect of environmental benefits discussed below in this IRP.

Table 14 presents a projection of retail customer energy supply rates for Residential and MGT customers for the period 2011 through 2015. The projections are based on the Reference Case and are also in real dollars (2010 $).

Table 14: Customer Energy Supply Rate Projections (2010 $)

Confidential Material Omitted

Real Dollars (2010$)

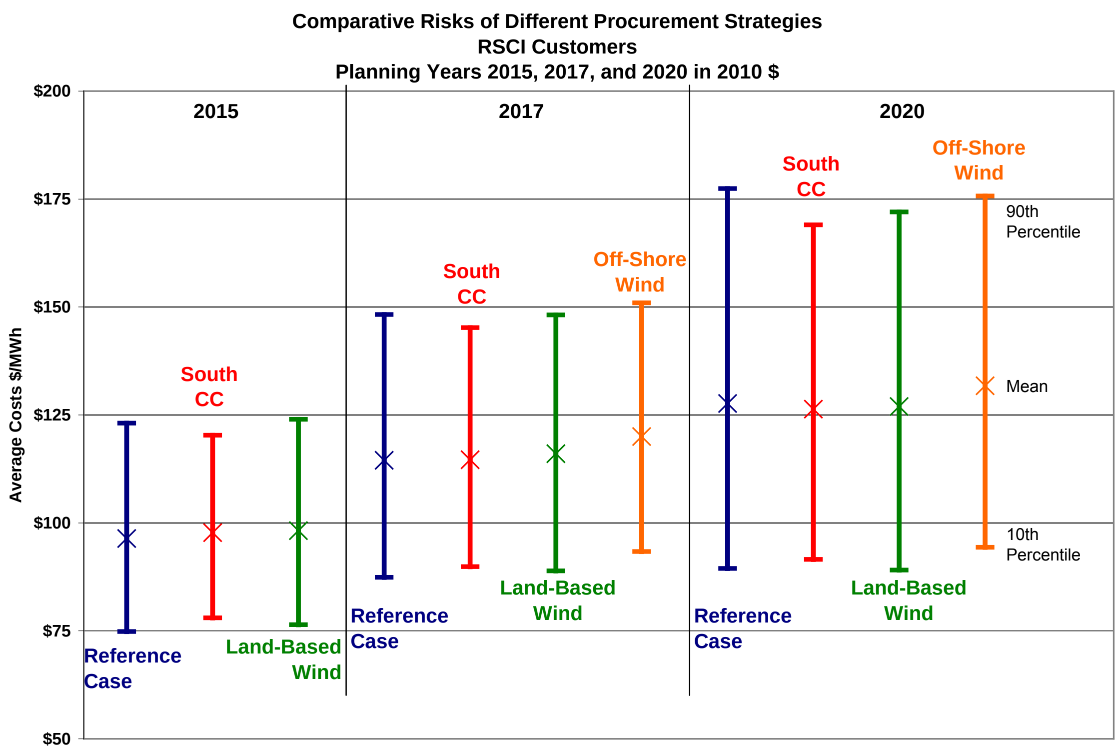
Planning	Residential Rates (Tariff "R")				MGT-S Rates			
Year	Demand ($/kW)		Energy (Cents/KWH)		Demand ($/kW)		Energy (Cents/KWH)	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Currently Effective	-	-	11.04	10.07	14.00	9.20	4.59	5.91
2011	-	-						
2012	-	-						
2013	-	-						
2014	-	-	11.49	10.76	15.58	9.68	5.02	6.14
2015	-	-	11.90	11.14	16.20	10.06	5.21	6.38

[45] The sensitivity of these results to future environmental regulations is examined below in this IRP. In general, the wind scenarios perform less favorably on the basis of price when environmental restrictions are less restrictive than in the Reference Case.

In order to evaluate price stability, which is an important planning criterion for SOS load, Delmarva prepared an analysis showing the expected range of prices for the Reference

Case and the Scenario Cases over the planning period. This analysis is based upon the 1000 simulations performed by the Portfolio Model for each year of the analysis. Figure 1 below shows a graphical comparison of the results of this analysis.

Figure 1



In Figure 1, 10% of the possible price outcomes for that case occur above the “top” of each line and 10% occur below the “bottom” of the line. The cross mark in between the top and bottom shows the average across all potential outcomes. Overall, Figure 1 shows that the expected range of prices is increasing over time for the Reference Case and the Scenario Cases. Figure 1 also suggests that the ranges of potential price outcomes for the Scenario Cases are somewhat less than the Reference Case because some future prices are fixed in these scenarios.

III. Environmental Health Impacts and Benefits

Based upon the environmental health impact and benefit assessment, air quality within the 4-km grid[46] and the State of Delaware is expected to improve greatly from 2010 to 2020. Tables 15 and 16 present emission totals for the 4-km grid and the State of Delaware, respectively, for the 2010 base case, the 2020 Reference Case, the off-shore wind scenario (S1), and the combined-cycle scenario (S3). The expected reductions in emissions between 2010 and 2020 in the various source sectors are due to implementation of emission control technologies required by state and federal rules, the closure of older facilities, fleet turnover of on-road motor vehicles and off-road equipment, the introduction of cleaner engine technologies, and the use of cleaner fuels.

Table 15 Emission Inventory Totals (tons/yr) by Sector for 2020 for the IRP Modeling Scenarios for the 4-km Grid.

Pollutant	*Sector	2010 Baseline	2020 Reference	Offshore Wind (S1)	Combined-Cycle (S3)
NO_x	EGU	168,830	114,487	114,455	114,492
	Non-EGU Point	145,021	142,595	142,595	142,595
	Nonpoint	205,407	205,095	205,095	205,095
	Nonroad	324,163	268,106	268,106	268,106
	On-road Vehicle	491,757	182,117	182,117	182,117
SO_2	EGU	408,104	98,223	97,788	96,074
	Non-EGU Point	158,247	152,253	152,253	152,253
	Nonpoint	218,050	218,010	218,010	218,010
	Nonroad	38,838	39,998	39,998	39,998
	On-road Vehicle	4,636	4,721	4,721	4,721
Hg	EGU	2.0342	0.8472	0.8477	0.8463
	Non-EGU Point	3.9888	4.3576	4.3576	4.3576
	Nonpoint	1.6078	1.6975	1.6975	1.6975

*EGU = Electric Generating Unit

[46] The 4-km grid covers much of the Mid-Atlantic region including Delaware. See Appendix 6, Figure 1-1.

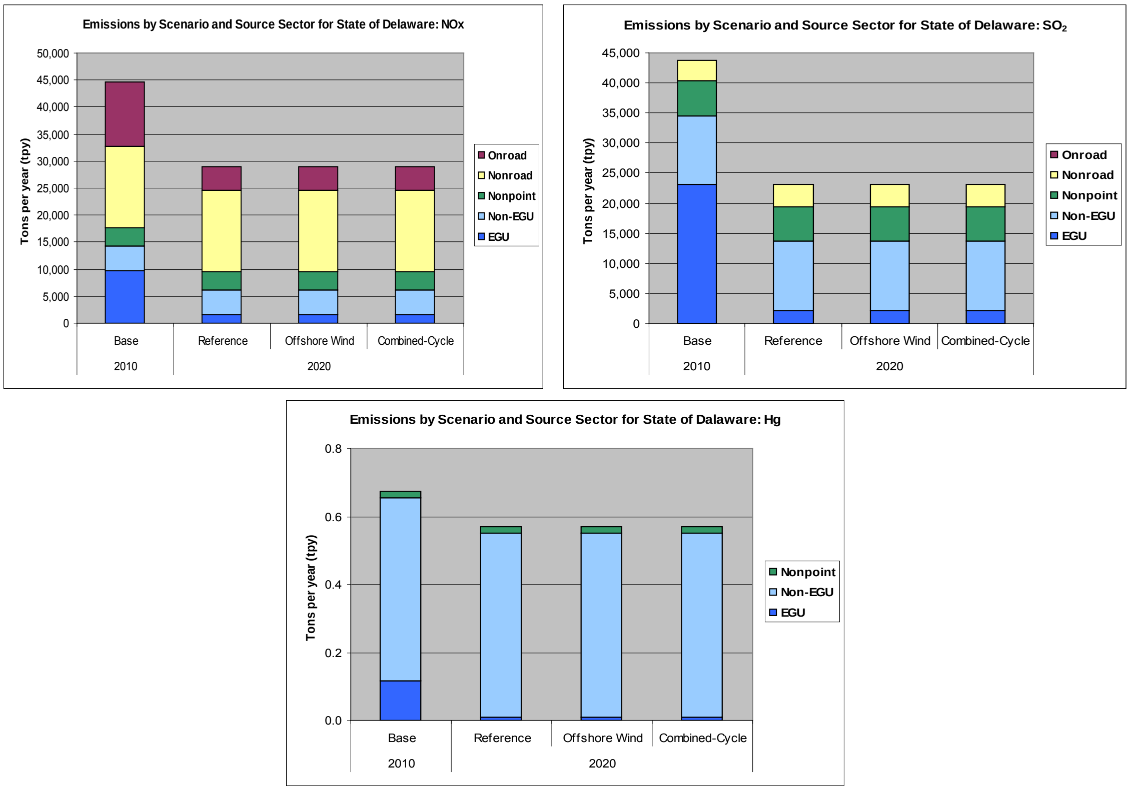
Table 16 Emission Inventory Totals (tons/yr) by Sector for 2020 for the IRP Modeling Scenarios for the State of Delaware.

Pollutant	Sector	2010 Baseline	2020 Reference	Offshore Wind (S1)	Combined-Cycle (S3)
NO_x	EGU	9,678	1,509	1,509	1,525
	Non-EGU Point	4,678	4,678	4,678	4,678
	Nonpoint	3,265	3,253	3,253	3,253
	Nonroad	15,144	15,173	15,173	15,173
	On-road Vehicle	11,893	4,334	4,334	4,334
SO_2	EGU	23,056	2,095	2,096	2,097
	Non-EGU Point	11,530	11,530	11,530	11,530
	Nonpoint	5,797	5,796	5,796	5,796
	Nonroad	3,315	3,672	3,672	3,672
	On-road Vehicle	112	110	110	110
Hg	EGU	0.1168	0.0083	0.0083	0.0083
	Non-EGU Point	0.5395	0.5423	0.5423	0.5423
	Nonpoint	0.0166	0.0182	0.0182	0.0182

Figures 2a through c present emissions estimates by source sector for the State of Delaware for the 2010 base case, the 2020 Reference case, the off-shore wind scenario (S1), and the combined-cycle scenario (S3) for NO_x, SO_2, and Hg. The figures present the large expected reduction in emissions between 2010 and 2020. They also illustrate the portion of overall emissions from the EGU sector and the relatively slight changes in emissions for the off-shore wind and combined-cycle scenarios compared to the 2020 reference case.

Figure 2 Emission Totals by Source Category for the State of Delaware for the IRP Modeling Analysis Scenarios 2010 Base, 2020 Reference Case, Scenario S1 (Offshore Wind), and Scenario S3 (Combined-Cycle): NO_x, SO_2 and Hg

(a) NO_x (b) SO_2 (c) Hg



The change in power plant emissions over time can be used to evaluate the change in ozone and particulate matter that affects air quality and impacts human health in Delaware. Using environmental modeling tools developed by the US Environmental Protection Agency (EPA) and available in the public domain, Delmarva has estimated the human health impacts for the Reference Case as compared to the Scenario Cases from an air quality base line of 2010. The methods and procedures of the analysis are described in Section 3e and Technical Appendix 6 of the IRP.

Due to the uncertainty surrounding the preparation of the estimated impact of changes in air quality on human health, the estimates are presented as a range of values as opposed to a single value. Table 4 below shows the estimated range of monetized human health benefits, derived from the EPA models, that is expected to occur for Delaware as a result of the decrease in power plant emissions in the Reference Case from 2010 to 2020.

Table 4

Total BenMAP Aggregated Valuation Results for $PM_{2.5}$
and Ozone for Reference Case Changes 2010- 2020
($2008 in Millions).

	Delaware	
	High End	**Low End**
2010-2020		
PM-Mortality (Laden, 3% discount rate)	3,900	—
PM-Mortality (Pope, 7% discount rate)	—	1,400
PM-Morbidity	86	86
Ozone-Mortality (Levy)	350	350
Ozone-Morbidity	6	6
Total	*4,342*	*1,842*
Total (2 significant figures)	**4,300**	**1,800**

More $PM_{2.5}$ Mortality estimates are presented in Appendix 6 based upon a number of expert studies. In Table 4 only the highest value (Laden) and lowest value (Pope) are presented.

The estimated human health benefits arising from the Reference Case by 2020 shown in Table 4 are very significant. These results are affected by the expected reductions in power plant emissions that:

- The expected retirement of over 15 GW of coal fired generation in PJM by 2020,
- Expected reductions in emissions from remaining coal generation,
- Large increases in the expected implementation of renewable resources within Delaware and other Mid-Atlantic regions (including Delmarva's renewable resource portfolio),
- The expected construction of 17 GW of new gas-fired generation within PJM, and
- Implementation of tighter Federal and regional environmental regulations.

These factors, as well as other factors not related to power generation resources, contribute to greatly improving air quality and human health over the 10 year planning horizon. The addition of renewable (i.e., off-shore and on-shore wind) and combine cycle generation resources to the generation mix over what is already anticipated in the Reference Case will not greatly influence the range of expected human health benefits in 2020. More details on this analysis are provided in a detailed technical summary report in Technical Appendix 6.

IV. Life Cycle Analysis

Life Cycle Assessment (LCA) is a quantitative, “cradle-to-grave” evaluation of the environmental and human health impacts of products, services and systems, and includes all processes associated with extraction of raw materials, processing of materials, transportation, energy inputs, production, use, distribution, recycling, waste treatment, and disposal. Delmarva used the draft ANSI SCS-002 Life-Cycle Stressor-Effects Assessment (LCSEA) standard to evaluate the environmental performance of the proposed electric power generation systems in the three scenarios cases compared with the Reference Case on a comprehensive, technology-neutral and fuel-neutral basis. The methods and procedures of the analysis are described in Section 3e and Technical Appendix 7 of the IRP.

The end result of the environmental LCA are the Environmental Power Declarations for the offshore, onshore and combined cycle gas scenarios which are presented below in Figures 3, 4 and 5, respectively.

The Environmental Power Declarations provide a visual summary of the system impact profile (impact indicator results) as compared to the Reference Case profile, which is indicated by the vertical line. Figures 3 and 4 show that both the offshore and onshore wind scenarios have a minimal impact profile in comparison to the Reference Case. Figure 5 depicts the combined cycle gas scenario which has a greater impact profile in comparison to the Reference Case and to the two wind scenarios.

Figure 3
Environmental Power Declaration for 150 MW Offshore Wind Scenario

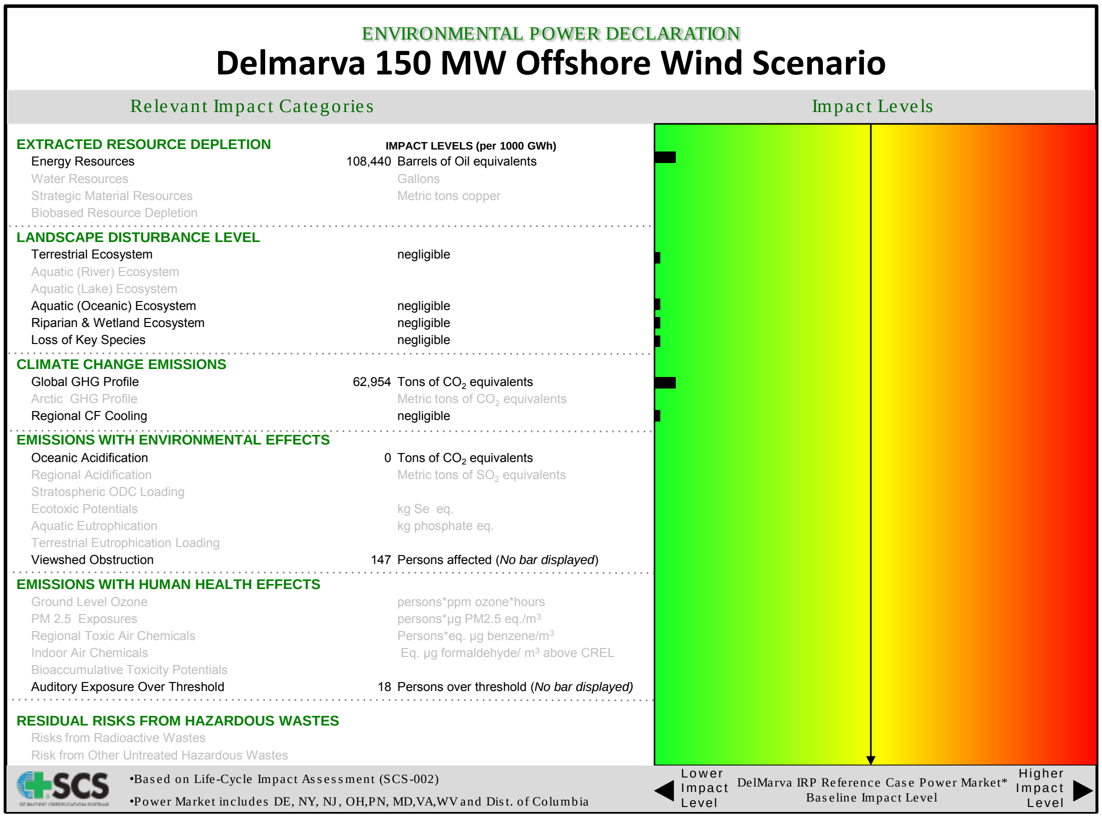


Figure 4
Environmental Power Declaration for 150 MW Onshore Wind Scenario

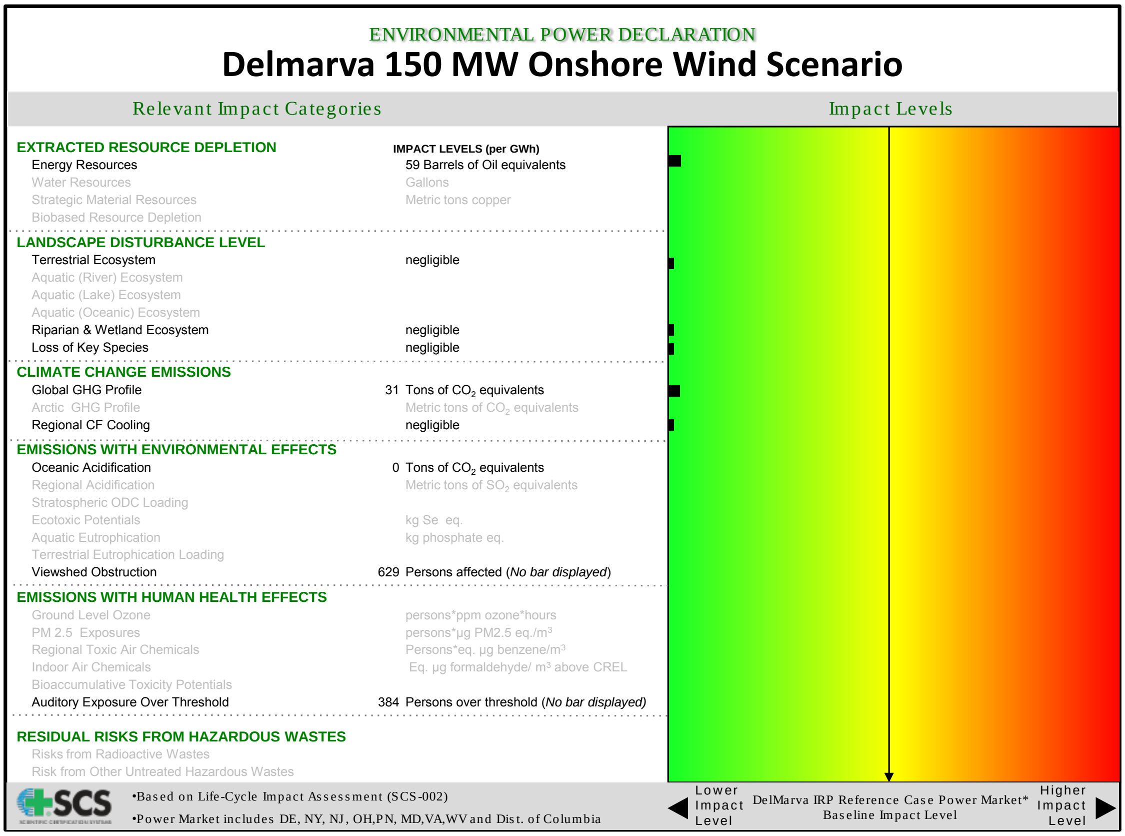
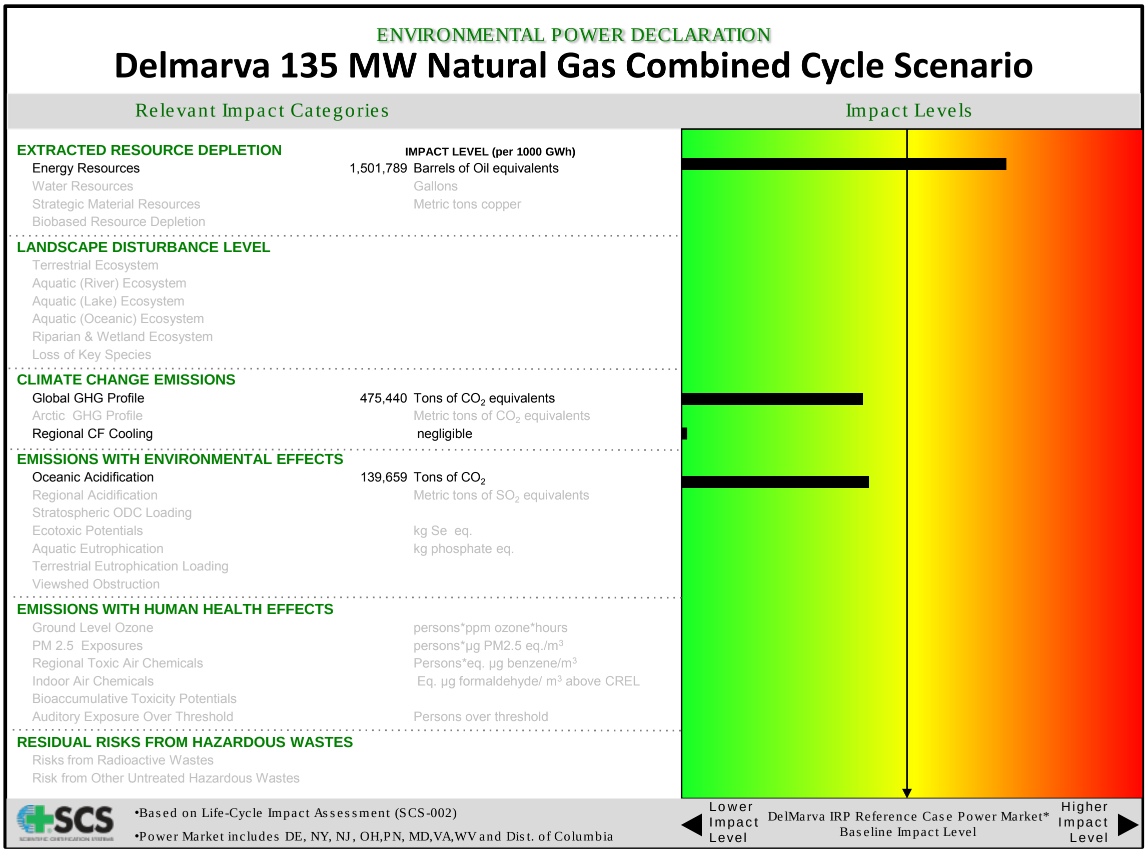


Figure 5
Environmental Power Declaration for 135 MW Combined Cycle Gas Scenario



V. Recommended Path Forward

Delmarva's current procurement strategy has been to:

4. procure a series of staggered three year contracts for Full Service Requirements Agreements (FSA) energy for Residential and Small Commercial SOS customers and one year FSAs for Large Commercial SOS customers,
5. construct a portfolio of renewable energy resources to provide for the needs of RSCI and LC SOS customers which increases in size over time consistent with the requirements of the Delaware Renewable Portfolio Standards (RPS), and,
6. Bundle the renewable portfolio together with the FSA's to complete the procurement of electrical requirements for SOS customers.

This strategy has provided SOS customers with reasonable and stable energy prices. The renewable portfolio included in this strategy includes the procurement of over 350MW of nominal capacity of a diverse mix of land-based wind, off-shore wind, and solar resources to support SOS customer requirements. Further, the reduction in power plant emissions expected under the Reference Case between 2011 and 2020 provides significant improvements in air quality and health benefits for the State of Delaware. Based upon EPA models of air quality, the range of expected health benefits occurring in 2020 relative to 2010 in Delaware is $1.8 B to $4.3 B.

In conclusion, Delmarva's current procurement strategy should be continued as it provides an appropriate balance of reliable and reasonable cost energy supply, price stability and environmental benefits.

EXHIBIT

B

Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP")
Joint Proposal to Ratify PSC Docket No. 10-2

The undersigned parties believe that Delmarva Power has met the requirements for ratification of the IRP. The Commission Staff ("Staff"), the Division of the Public Advocate ("DPA"), Caesar Rodney Institute ("CRI") and Delmarva Power & Light Company ("Delmarva" or "DPL") hereby request that the Hearing Examiner recommend that the Commission ratify the current IRP. Staff, DPA, CRI and Delmarva further request that the Hearing Examiner's recommendation provide that future IRPs proceed as set forth in the following proposals:

1. The IRP recommends that DPL continue to manage its supply portfolio in the manner currently approved by the Commission. As needed in the future, DPL will seek Commission approval through separate applications for changes to resources or process(es) to secure resources.

2. A process for stakeholder participation, in the form of an IRP Working Group, will meet at least once a quarter going forward.

3. The written comments of parties to PSC Docket No. 10-2 discuss recommended modifications for the next IRP filing, due in December 2012. An evaluation process for addressing the following modifications will be developed in collaboration with the IRP Working Group:

    a. Changes to load forecasting methods
    b. Additional analyses of DSM
    c. Provide documentation of IRP Scenario selection
    d. Use of an alternative Air Quality model to evaluate human health benefits
    e. More robust discussion of transmission options and interconnection issues
    f. Address the effect on customer bills resulting from the increased use of renewable resources

4. Instead of creating and submitting an entirely new, highly detailed filing every two years, DPL should alternate "new" filings, such as the 2010 IRP, with "updated" filings, where existing models and studies may be updated or additional studies may be added (in a manner compliant with EURCSA) to be defined in the IRP Working Group between now and Delmarva's next IRP filing (December 1, 2012). This modification to the process will allow for improvement to the IRP and IRP process, while avoiding unnecessary additional costs to Delmarva's SOS customers.

The IRP Working Group (or Special Task Team if appropriate) will discuss and collaboratively evaluate the following issues (in priority order):

1. Define "new" vs. "updated" versions of the IRP.
2. Discuss steps to be taken to continue the evaluation and potential implementations of natural gas fired generation on the Delmarva Peninsula, including, but not limited to: evaluation criteria, RFQs, RFPs, accounting issues on future PPAs, and the benefits of regulated versus merchant generation.
3. Assessment of alternatives to DPL's current procurement process for SOS customer supply requirements.

The signatories to this document also agree that the proper forum to initiate a process to consider rule changes to make electric choice more competitive should be through a separate Working Group outside of the IRP Working Group and future IRP Dockets..

/s/ Todd Goodman	/s/ William O'Brien	/s/ Michael Sheehy
Delmarva Power	DPSC Staff	Public Advocate

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Caesar Rodney Institute

EXHIBIT

C

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF DELAWARE

IN THE MATTER OF INTEGRATED RESOURCE PLANNING FOR THE PROVISION OF STANDARD OFFER SERVICE BY DELMARVA POWER & LIGHT COMPANY UNDER 26 *DEL. C.* §1007(c) & (d)	**)))))**	**PSC DOCKET NO. 10-2**

ORDER NO. _____

AND NOW, this 20th day of December, 2011:

WHEREAS, on December 1, 2010, Delmarva Power & Light Company (“Delmarva”) filed with the Delaware Public Service Commission (“the Commission”) its Integrated Resource Plan ("IRP") as required under the Electric Utility Retail Customer Supply Act of 2006 ("EURCSA") 26 *Del. C. §* .1006 *et seq.*

WHEREAS, on or before May 31, 2011 several parties filed their comments to the IRP; these parties included the Delaware Public Service Commission Staff ("Staff'), the Delaware Division of the Public Advocate ("DPA"), the Department of Natural Resources and Environmental Control ("DNREC"), The Caesar Rodney Institute ("CR1"), NRG Energy ("NRG"), Calpine Corporation ("Calpine"), Mid-Atlantic Renewable Energy Coalition ("MAREC"), Delaware Energy Users Group ("DEUG"), The Sierra Club ("Sierra Club"), Retail Energy Supply Association ("RESA") and Eastern Shore Gas Company ("ESNG"). In addition, two interested participants - Delaware Nurses Association and John Greer - filed comments on May 31, 2011 with the parties.

WHEREAS, on or before July 29, 2011, Delmarva filed its reply comments in order to respond to comments of the parties.

WHEREAS, on or before November 17, 2011, counsel for Delmarva, Todd Goodman, Esquire, on behalf of Commission Staff, the Division of the Public Advocate, Caesar Rodney Institute and Delmarva reached an agreement entitled, "Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2 ("Path Forward")." Mr. Goodman informed the Hearing Examiner that DNREC would not join the recommended path forward. Signatures had not been obtained from Intervenors NRG, Calpine, MAREC, RESA, DEUG, Sierra Club and ENG.

WHEREAS, after consideration of the letters from the public, the discussions of the workshops held to consider the IRP, the comments filed by the parties and Delmarva's Reply Comments, the Hearing Examiner held that there was ample evidence to find that the requirements for public investigation and comment had been satisfied under 26 *Del.C.* §3010.9.2.

WHEREAS, the Hearing Examiner recommended in her Report and Recommendations, submitted on November 22, 2011, that Commission should ratify the IRP pursuant to 26 *Del.C.* §3010.2.0 as it is reasonable and is in the best interests of Delaware ratepayers;

WHEREAS, the Hearing Examiner further recommended that the Commission approve the signatory parties Path Forward as just and reasonable and in the public interest as it provides a mechanism for the parties and interested persons to improve upon the 2010 IRP, address specific concerns raised by the commentators to the current

IRP and provide mandatory meetings to discuss and evaluate studies, scenarios and inputs for the next IRP that must be filed on or before December 1, 2012.

NOW, THEREFORE, IT IS HEREBY ORDERED BY THE AFFIRMATIVE VOTE OF NO FEWER THAN THREE COMMISSIONERS:

1. That the Commission hereby adopts the Findings and Recommendations of the Hearing Examiner, appended to the Original hereof as Attachment "A."

2. That the Commission ratifies the Integrated Resource Plan, filed in compliance with the Electric Utility Retail Customer Supply Act of 2006 ("EURCSA") 26 *Del. C.* §1006 *et seq.,* which is appended to the Original hereof as Exhibit "A" to the Hearing Examiner's Report.

3. That the Commission approves the "Proposed Path Forward on Delmarva Power & Light Company's Integrated Resource Plan ("IRP"): Joint Proposal to Ratify PSC Docket No. 10-2," appended to the original hereof as Exhibit "B" to the Hearing Examiner's Report.

4. That the Commission reserves the jurisdiction and authority to enter such further Orders in this matter as may be deemed necessary or proper.

BY ORDER OF THE COMMISSION:

____
Chair

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Commissioner

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Commissioner

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Commissioner

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Commissioner

ATTEST:

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Secretary