Synapse
Energy Economics, Inc.

Maximizing Benefits:

Recommendations for Meeting Long-Term Demand for Standard Offer Service in Maryland.

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1. Introduction

The state of Maryland has a compelling interest in ensuring reliable, affordable, clean and safe electricity for the state's residents, and in harnessing the power and innovation of the marketplace to do so. Any such effort should be based on a realistic, up-to-date assessment of the state's needs for electricity generating capacity and energy, and should open the door to solutions that provide the maximum benefits possible. These benefits include reliable service, but they go much further—to include price stability, risk management, economic development and job creation, energy security, and reducing harmful emissions of pollutants and climate-altering greenhouse gases.

To address some of these needs, the Public Service Commission of Maryland ("the Commission") issued a draft Request for Proposals (RFP) for new generating capacity and energy in December 2010. The Commission subsequently revised the RFP numerous times, most recently on December 8, 2011. The state's utilities were required to issue the RFP by October 7, 2011, and responses are now due January 20, 2012. The Commission has also asked interested parties to submit comments by January 13, and participate in a January 31 hearing, on the need for new capacity in Maryland. These comments, prepared on behalf of The Sierra Club, are responsive to the Commission's request.

We find that Maryland does not have a need for new gas-fired capacity and energy and should not procure new resources under this RFP. We conclude that procuring capacity and energy under the RFP would be unlikely to yield the maximum possible benefits for Maryland's ratepayers for the following reasons:

1. The RFP is based on a limited and outdated determination of need:
    - The increase in demand projected as of 2008 has not materialized—indeed, the Commission's own forecasts have decreased significantly compared to those from 2008. Given the lower forecasts of demand, and the results of the recent RPM capacity auctions, we find that Maryland does not have a need to procure new gas-fired capacity and energy;
    - Importantly, this statement holds true even using PJM and the Commission's conservative projections of future capacity additions, which do not account for the capacity additions that will be required in order for utilities to meet the state's Renewable Portfolio Standard or the long-term impacts of EmPower or other energy efficiency initiatives;
    - Finally, even if all expected coal plant retirements in Maryland materialize, and the expected replacements for those plants *don't* materialize, we find that there is still no need to procure new gas-fired capacity and energy to meet demand.
2. The RFP is too narrow in its focus on only gas-fired resources to meet the state's needs:
    - While the price outlook for natural gas is comparatively low today, long-term uncertainty in natural gas prices presents a considerable risk to ratepayers under a contract with variable gas price terms. Resources with greater price stability

should be given the opportunity to compete with natural gas resources in any procurement process;

- Proposals of fixed-price terms for natural gas—which are likely to include a premium to hedge against the "gas price uncertainty" risk mentioned above—should also be subject to competition from a wider range of resources, including renewable energy and demand-side resources, in order to ensure the lowest cost and greatest benefits for ratepayers.

In light of these findings, we strongly recommend that the utilities *not* procure capacity under the current process, but rather that the state undertake a new procurement process that addresses Maryland's present energy needs and allows for competition from a wider range of energy resources. While we find that there is no need for new gas-fired energy or capacity in Maryland, the state does have a long-term interest in developing new renewable energy and energy efficiency resources in order to meet Renewable Portfolio Standard and EmPower policy obligations, as well as the goals set out in Maryland's Greenhouse Gas Emissions Reduction Act.

In Section 4 of these comments, we identify criteria that the Commission can apply to ensure the maximum benefit for ratepayers from Maryland's capacity and energy procurement initiatives. At minimum, we urge the Commission to open any procurement initiative to a wider range of resources, so that the merits of each can compete on a level playing field. Absent this change, Maryland ratepayers could be saddled with excess costs for resources that are not needed, and that do not reflect their combined interests in reliability, reasonable cost, risk reduction, environmental protection, and economic development.

A. The Public Service Commission's RFP Process

The basis for the Commission's Request for Proposals (RFP)[1] was its concern "about the adequacy of the state's generation resources to serve long-term anticipated demand for electricity." In recent years, Maryland's reliability requirement for electric generating capacity has been met through PJM's capacity market, known as the Reliability Pricing Model (RPM).

In addition to procuring short-term capacity commitments through the RPM market, the state or the Commission may reasonably direct Maryland's utilities to procure new capacity and energy resources to ensure reliability and/or to pursue other public policy objectives, and this is the basis of the current RFP. But while Maryland is within its rights to direct capacity procurement, the state's current approach has crucial shortcomings, which are discussed in detail in these comments.

Section 2 of this paper shows that Maryland's current RFP is predicated on an outdated and shortsighted analysis of the state's capacity needs. Section 3 discusses the risks associated with limiting the RFP to proposals for new gas-fired capacity and energy. Section 4 identifies recommended criteria that the Commission can apply to ensure the maximum benefit for ratepayers from Maryland's capacity and energy procurement initiatives.

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[1] Public Service Commission of Maryland, Request for Proposals for Generation Capacity Resources under Long-Term Contract, September 29, 2011. ("RFP")

2. Assessing Maryland's Capacity Needs

"Resource adequacy" refers to the need to have enough generating resources available to produce the maximum electricity demanded in a region at any time during the year, including a margin of safety in case something goes wrong, or in case load is even higher than expected. Because it takes years to build most generating plants, ensuring resource adequacy from the supply side requires a certain amount of projecting what loads will be, and what resources will be available, years into the future.

Of course, such projections are always subject to uncertainty, and must be revised regularly as conditions evolve. Thus it is unlikely to be beneficial for ratepayers when a planning process relies on outdated or limited information that does not fully reflect market conditions.

The Commission's RFP is predicated, at least in part, on PJM reports indicating a lack of capacity in the state. Specifically, the RFP cites a 2008 analysis "that showed shortfalls of up to 1,500 MW depending on assumptions regarding load, generating portfolios, and whether various transmission lines (most notably the Trans-Allegheny Interstate Line ("TrAIL")) would be in service as scheduled." (RFP, p.2)

These 2008 predictions are no longer valid or useful, given a number of significant changes in the state's capacity need in the intervening years. The following key factors have either changed or were not accounted for in the initial analysis of capacity need:

- Load forecasts in Maryland have been reduced significantly since 2008;[2]
- The TrAIL transmission project is currently on-line and, as intended, has increased import capability to the region;
- The initial forecasts of capacity requirements have been tempered by a much more robust development of demand-side management resources than had been anticipated or accounted for by PJM;
- Maryland's goals for procuring renewable energy through its Renewable Portfolio Standard (RPS) and increasing energy efficiency to manage load through its EmPower program were not accounted for in PJM's analysis.

All of these factors corroborate a more optimistic view of the net balance of capacity (available supply, minus peak demand plus reserves) in Maryland. The Commission should take all of these important factors into account in assessing resource adequacy in Maryland, and should not rely on an outdated and limited assessment of its capacity needs.

A. Capacity Requirements and Cleared Capacity in the RPM Auctions

Compelling evidence of Maryland's significantly improved resource adequacy outlook comes from the more recent RPM capacity auctions, which are held each year to procure and ensure capacity for delivery three years into the future. These "Base Residual Auctions", or BRAs, are cleared based on PJM's evolving forecast of each region's reliability requirements and generator offers for capacity, along with import constraints for each region.

[2] Based on load forecasts from Maryland PSC Ten-year plans from 2008 and 2010 (most recent).

In the "SWMAAC" region, which comprises much of Maryland, the paucity of new generating capacity additions along with announced plant retirements has fed the perception of a lack of capacity in the region. However, as shown in Figure 1, the auction outcomes tell a different story. The volume of load reduction measures (demand response and energy efficiency) have increased dramatically in recent auctions, from only 20 MW in the 2007/2008 auction to 1,760 MW in the most recent auction, for the 2014/2015 delivery year. There is every reason to believe that this low-cost, clean resource will continue to grow in the next few years. However, PJM's load forecast approach is blind to such trends, anticipating no new energy efficiency or demand response after 2013 for any utilities.[3]

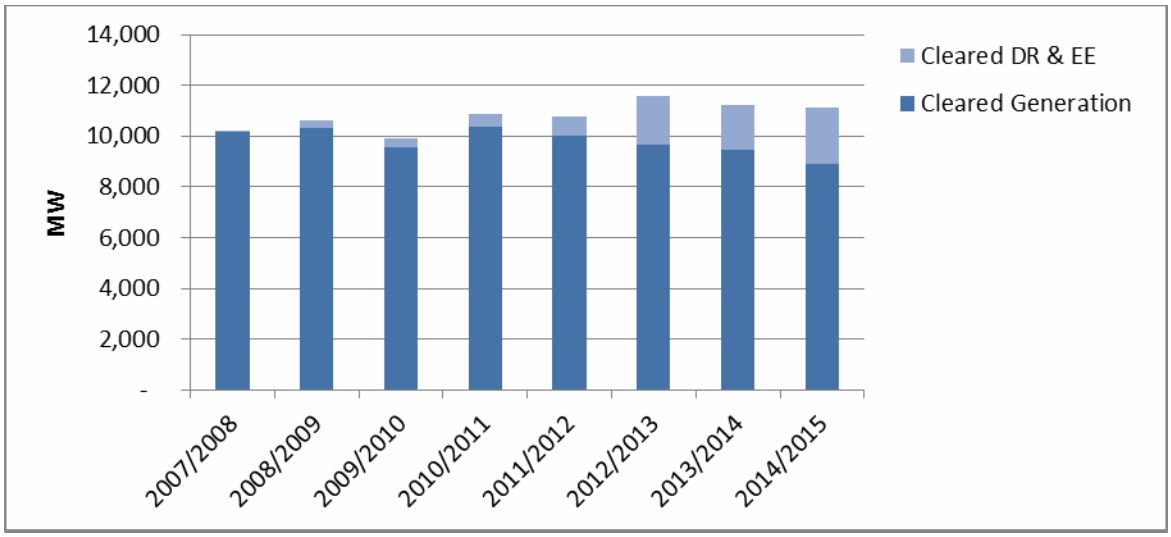


Figure 1. SWMAAC Capacity Cleared by PJM Base Residual Auction

Data Source: PJM Base Residual Auction results from all years; Monitoring Analytics, "In the Matter of the Reliability Pricing Model and the 2013/2014 Delivery year Base Residual Auction Results," Admin. Docket PC22, Responses to Questions from the Maryland PSC.

Supplementing this increase in peak-reduction resources, the import capability for the SWMAAC region has increased in the intervening years, reducing the local generation needed to meet reliability requirements. In early RPM auctions, SWMAAC utilities were required to pay a premium for capacity compared to PJM as a whole due to import constraints, reflecting the reliability concerns expressed by PJM in 2007 and 2008. However, in the auctions for the delivery years 2012/2013 and 2013/2014, SWMAAC did not have a local shortage of capacity—but local utilities still paid a premium for capacity, because of import constraints into the larger MAAC region. In the latest auction, for delivery year 2014/2015, neither MAAC nor SWMAAC had binding constraints, leading to capacity prices that reflected access to capacity throughout PJM. The prices for SWMAAC, compared to PJM as a whole, are shown in Figure 2.

[3] PJM Load Forecast Report, PJM Resource Adequacy Planning Department, January 2011. http://www.pjm.com/~/media/documents/reports/2011-pjm-load-report.ashx.According to this report, : "Assumptions for both LM and EE [Load Management and Energy Efficiency] are based on Reliability Pricing Model (RPM) auction results"

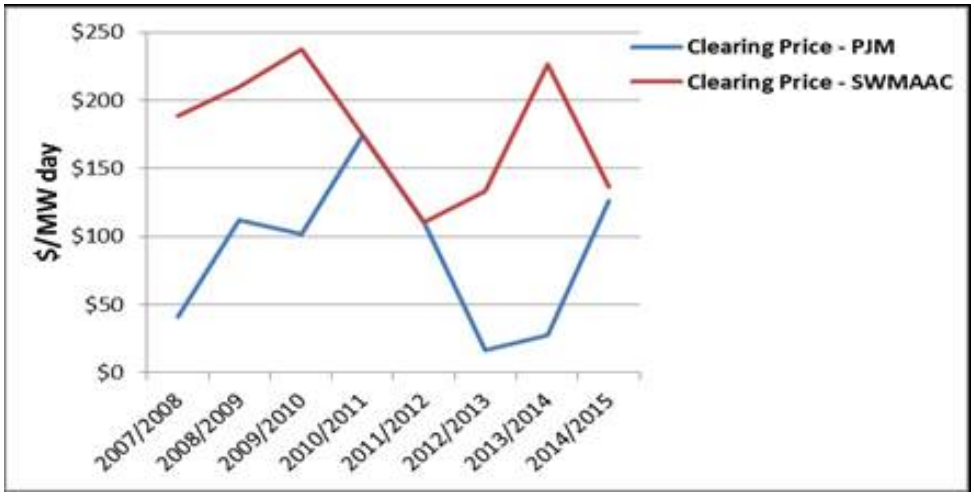


Figure 2. SWMAAC and PJM Clearing Prices by PJM Base Residual Auction

Data Source: PJM Base Residual Auction results from all years.

A primary metric used by PJM to determine if a local delivery area, such as SWMAAC, is likely to be short of capacity is the ratio of the needed capacity imports, called the Capacity Emergency Transfer Objective (CETO), to the amount of capacity that can reliably be physically delivered to the region, called the Capacity Emergency Transfer Limit (CETL). This ratio, often called CETL/CETO, is projected to further improve for SWMAAC in the near future based on new transmission projects coming on-line, and based on reduced load due in part to demand-side management. As shown in Figure 3, CETL has steadily increased for SWMAAC, while CETO has declined—leading to dramatic improvements in PJM's metric for reliability. According to PJM, if CETO/CETL is less than 1.15 for a given region, then it must be treated as a potentially constrained region. For SWMAAC, CETO/CETL was close to this limit for the 2011/2012 auction (held in 2008) and before, but has since surged into much safer territory—in the most recent auction, as high as 1.42.

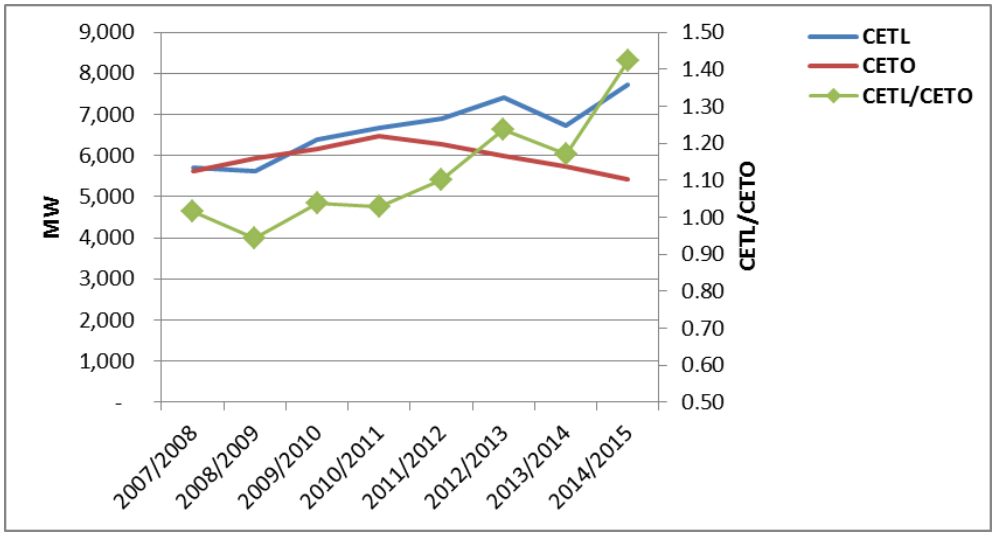


Figure 3. PJM's Capacity Import Metric for SWMAAC

Data Source: PJM Base Residual Auction results from all years; Monitoring Analytics, "In the Matter of the Reliability Pricing Model and the 2013/2014 Delivery year Base Residual Auction Results," Admin. Docket PC22, Responses to Questions from the Maryland PSC.

B. Maryland's Capacity Needs: The Commission's Evolving View

The Public Service Commission has regularly investigated PJM's capacity shortage claims from 2007 and 2008. In subsequent years, their reports have reduced the shortage amount, and finally found it to be a non-issue. As shown below, the shortfall has turned into a surplus, due in large part to deployment of demand resources, along with the new TrAIL transmission line.

The Commission's 2007 Interim Report echoed PJM in sounding the alarm for needed capacity. Citing PJM Senior Vice President of Reliability Services Michael Kormos, the report notes that "unless the TrAIL line is in service by 2012, the region's electricity load could exceed the transfer capability of the existing transmission system by 2,000 MW." With no new transmission lines, the report warns, this "could cause the net load to exceed the import capability by 3,000 MW…the regional shortfall could be as much as 6,500 MW… approximately 1,500 MW would fall on Maryland alone." *(Maryland PSC Ten-Year Plan 2007-2016, p. 15)*

In its 2008 Ten-Year Plan, the Commission downgraded this shortfall, noting that the TrAIL project was coming on-line. In this case, "The Mid-Atlantic Region faces a gap of approximately 2,600-3,000 MW, of which approximately 600-690 MWs are attributable to Maryland." *(Maryland PSC Ten-Year Plan 2008-2017, p. 15)* But just one year later, **in the 2009 Ten-Year Plan**, the Commission makes no mention of a shortfall in capacity. In this case the report notes that "with utility demand-side management and energy conservation measures [the updated forecast] is approximately 13,900 MW (13,913 MW). Providing an estimate for an appropriate reserve margin of an additional 2,157 MW, would result in estimated reliability requirement of 16,070 MW." *(Maryland PSC Ten-Year Plan 2009-2018, p. 8)*

In the 2010 Ten-Year Plan, no shortfall is mentioned—and the reliability requirement and resulting import requirements from transmission have decreased further:

> Maryland's peak demand forecast for 2010 with utility demand-side management and energy conservation measures is approximately 13,061 MW. Providing an estimate for an appropriate reserve margin of an additional 2,024 MW, would result in an estimated reliability requirement of 15,085 MW. Therefore, approximately 2,500 MWs (2,502 MW) of estimated capacity in the transmission system serves to meet Maryland's requirements during periods of peak usage in the system. *(Maryland PSC Ten-Year Plan 2010-2019, p. 7)*

Why has the region's resource adequacy picture improved so dramatically? One reason is the success of Maryland's demand reduction initiatives. Figure 4 shows the Commission's peak demand forecasts as documented in its past three Ten-Year Plans. Note that, while the 2009 forecast is lowest over time, the peak demand for Year 1 decreases in each subsequent forecast. Figure 5 shows Maryland's projected DSM resources implied by the Commission's analysis. Again, while the 2009 projection of DSM resources is highest over time, note that demand resources for Year 1 increases in each subsequent forecast. This record of success in managing the state's load is one important reason that the dire picture of capacity shortages from 2008, the year of PJM's warnings about potential capacity shortfalls, no longer applies.

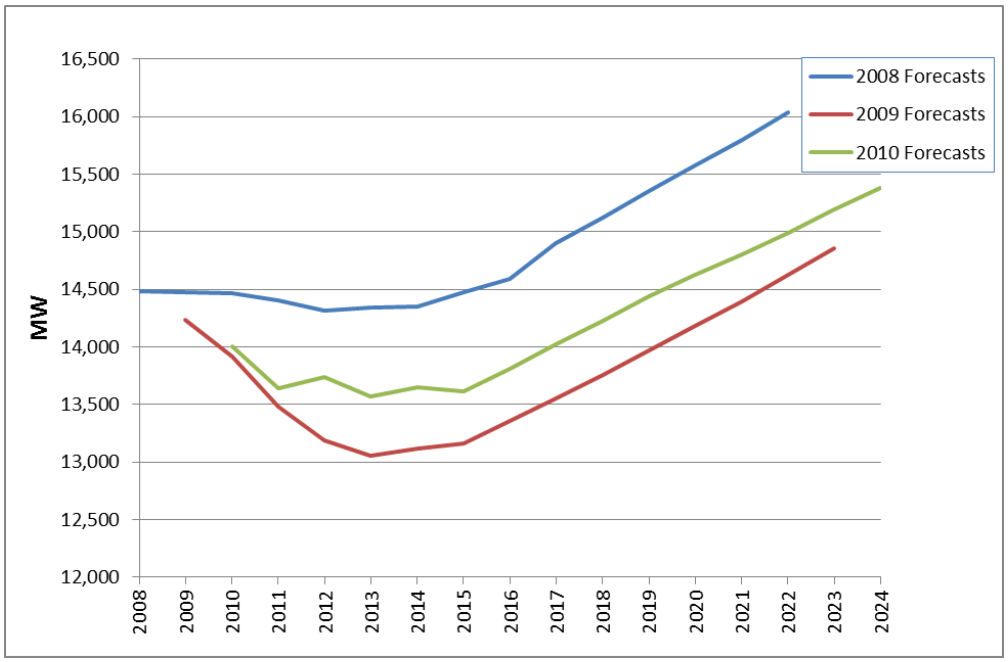


Figure 4. MD Peak Demand Forecast – Net of DSM

Data source: Table A-5(b) from the 2008, 2009, and 2010 Maryland PSC Ten-Year Plans

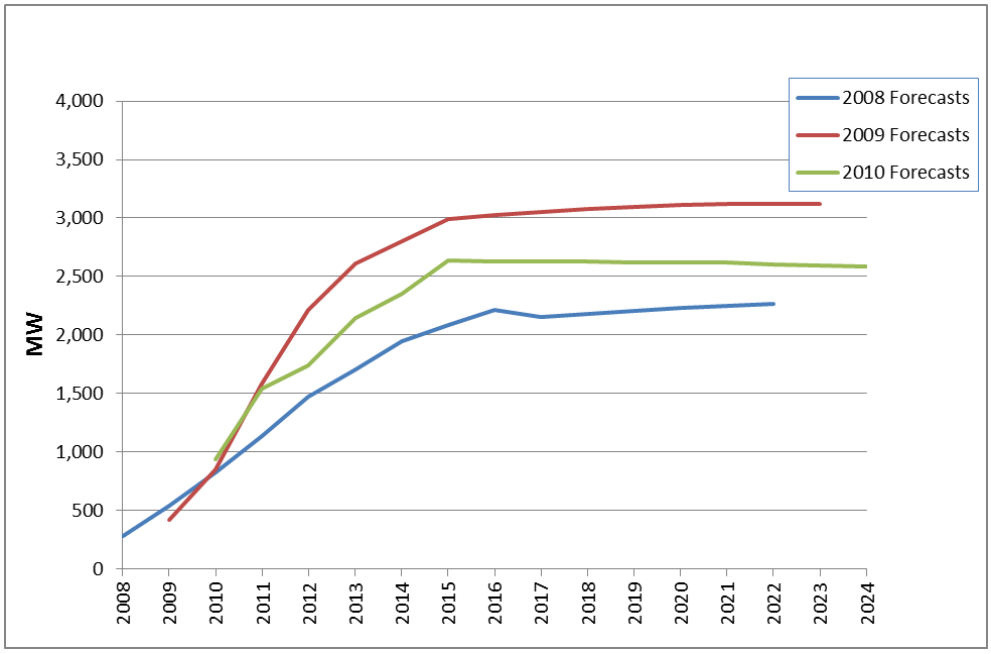


Figure 5. Inferred DSM from Peak Demand Forecasts

Data source: Tables A-5(b) and Tables A-5(d) from 2008, 2009, 2010 PSC Ten-year Plans

While the Commission's projections of DSM resources are more reflective of Maryland's DSM future than PJM's projections, we believe that they remain conservative. Specifically, they appear to assume no new load management measures after 2015, when EmPower goals should be met. We find it unlikely that the legislature and the Commission will suspend Maryland utilities' DSM activities at this point, given their significant reliability, cost, and environmental benefits relative to new supply side resources.

C. New Supply-Side Resources in Maryland

PJM's outlook for reliability in Maryland is fundamentally conservative, because it ignores a broad range of likely new resources. PJM's view of new resources is limited by its sole reliance on its three-year-forward RPM capacity market—any resource that cannot commit to being in service within three years is categorically excluded.

Taking PJM's lead, the Commission's most recent Ten-Year Plan only considered future capacity additions that had cleared PJM's RPM market. However, there is ample reason to believe that other new capacity will come on line beyond this three-year time horizon—because Maryland utilities will be required to purchase energy from such new resources, under the state's Renewable Portfolio Standard (RPS). In fact, the plan does not incorporate most of the additional capacity for compliance with Maryland's RPS, which stipulates that Maryland must meet 20% of its electricity demand by 2022 with electricity derived from qualifying renewable sources. The RPS includes a designated "carve-out" for distributed solar located in or connected to Maryland, escalating to 2% by 2022.

The Maryland Department of Energy has projected the composition of renewable resources that will meet the state's RPS, including the solar carve-out, biomass, and on- and off-shore wind, as

shown in Figure 6 below. This implies that the RPS will spur the development of new renewable capacity in future years, with most of the capacity to be built after the planning horizon of all current and past RPM auctions.

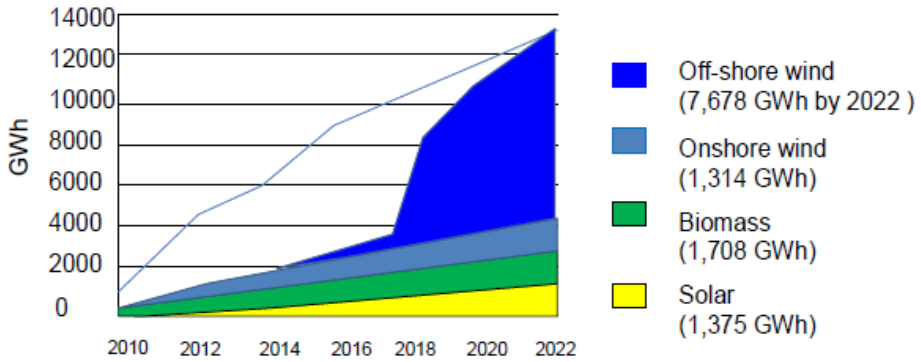


Figure 6. Projected resources to meet Maryland's RPS Goals

Figure source: Maryland Energy Administration, Plan to Increase Maryland's Renewable Energy Portfolio by 20% RPS by 2022, p.8.

In October 2011, the University of Maryland released a study projecting the effects of the state's RPS on resource adequacy.[4] The study presents both "baseline" and "alternative" scenarios, the latter including both compliance with RPS and meeting EmPower goals for load reduction. This study found that the current, adequate balance of capacity in SWMAAC will remain essentially constant 2015, and will be over 1,160 MW in 2020.[5]

Table 1. SWMAAC Alternative Scenario Balance of Capacity

Year	Reliability Requirement	Existing Generation	Planned Generation	Future Retirement	Tier 1 Solar	DSM	Import Capability	*Net Balance*
2012	17,220	10,911	1,421	739	17	1,430	7,400	***3,220***
2013	17,899	10,898	1,447	740	34	1,778	6,725	***2,242***
2014	18,647	10,898	1,570	740	51	1,933	7,123	***2,188***
2015	18,852	10,898	1,570	740	68	2,165	7,843	***1,949***
2016	19,025	10,898	1,570	740	87	2,166	7,843	***1,796***
2017	19,214	10,898	1,570	740	97	2,166	7,843	***1,616***
2018	19,397	10,898	1,570	740	160	2,166	7,843	***1,497***
2019	19,629	10,898	1,570	740	216	2,165	7,843	***1,320***
2020	19,844	10,898	1,570	740	274	2,166	7,843	***1,164***

Data Source: Meeting Maryland's Greenhouse Gas Reduction Goals: Electrical Reliability Impacts from Maryland's Climate Action Plan.

[4] Center for Integrative Research and Maryland Department of the Environment, "Meeting Maryland's Greenhouse Gas Reduction Goals: Electrical Reliability Impacts from Maryland's Climate Action Plan," October 2011.
[5] Figures reported here assume the absence of the proposed PATH transmission line, which now seems both unlikely and unnecessary. If PATH is included, the authors project that there will be a net positive capacity of over 3,200 MW in 2012 and nearly 2,200 MW by 2020.

D. Impact of Coal Plant Retirements

The University of Maryland study assumes only currently planned retirements of capacity in both the baseline and alternative cases. However, there is good reason to expect increasing pressure on coal plants to retire as stricter regulation of emissions is enacted by EPA, and in the face of higher coal prices in an increasingly global coal market. In fact, one significant benefit of Maryland's investments in renewables and demand-side resources should be a decreasing reliance on coal-fired electricity, which imposes a high cost in environmental quality, public health, and ultimately reliability as numerous coal plants face uncertain futures: coal resources in Maryland and around the country are coming under new and increasingly stringent EPA regulations under Best Available Retrofit Technology (BART), Cross-State Air Pollution Rule (CSAPR), Mercury and Air Toxics Standards (MATS) and the National Ambient Air Quality Standards (NAAQS) that regulate emissions, mercury, and particulates, in addition to new restrictions and costs associated with water use and handling of combustion residuals (ash).

It is likely that these coal plant retirements will be facilitated and offset by new generation investments in Maryland: under the recently proposed settlement for the merger of Exelon Corporation and Constellation Energy Group,[6] the parties propose a suite of new gas and renewable generation projects to be located in the Baltimore region and elsewhere in the state, which should alleviate reliability concerns related to coal plant retirements in Maryland.

Despite the likely outcome of the merger settlement, it is reasonable to consider the implications if a large fraction of Maryland's coal-fired generating capacity were to retire without replacement, decreasing available generating capacity in the state by close to 900 MW. Table 1 shows that Maryland's capacity balance has enough surplus for this scale of coal retirement under the state's current renewable energy and energy efficiency policies. Thus we conclude that even in the highest coal retirement case with the most pessimistic view of replacement resources, Maryland's capacity balance does not warrant Commission action to procure new gas-fired capacity at this time.

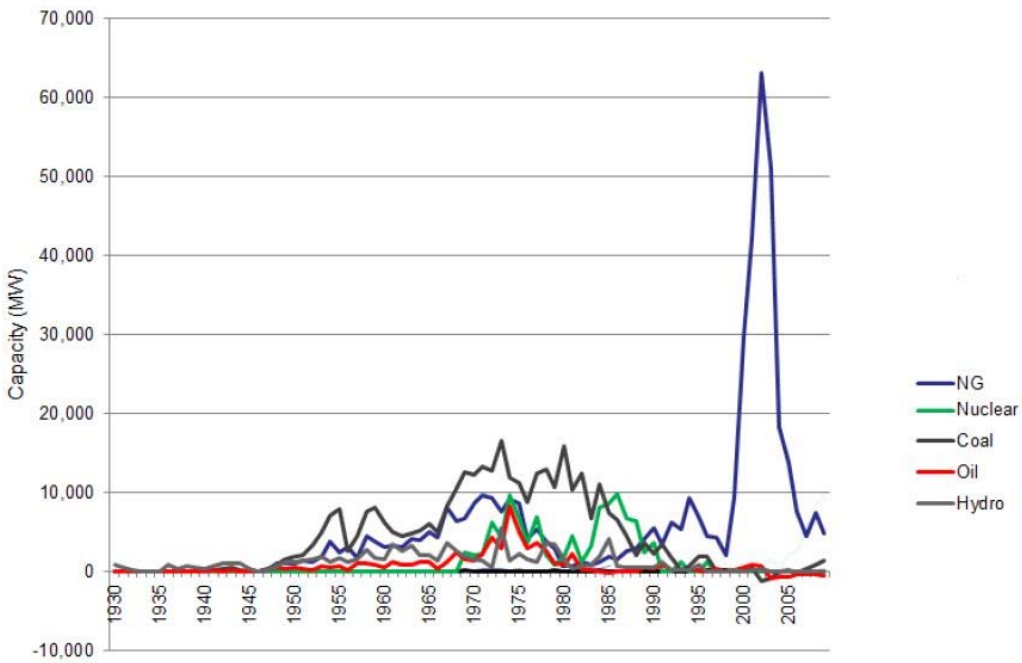
3. Risks of Relying on Natural Gas

In the current RFP, the Commission articulates a desire to capitalize on the benefits of low gas prices. While we agree that reducing the state's reliance on coal will provide a wide range of economic, environmental, and public health benefits, it is important to also consider the *risks* presented by exposure to the long-term uncertainty in natural gas prices. History has shown that relying on natural gas for cost savings is an uncertain proposition at best.

Natural gas is a fossil fuel with—today—a largely domestic market. Over the past couple of decades, this market has been characterized not only by widely oscillating prices, but by rapid paradigm shifts in market outlook. In the 1990s, electric industry restructuring combined with apparently abundant and low-cost natural gas fueled a massive building boom for natural gas-fired generating plants, and market expectations were that electricity prices would be defined by the

[6] Public Service Commission of Maryland, Case 9271: "Joint Petition for Approval of Settlement", filed December 15, 2011.

cost of natural gas ($2.50-$3.50 per million BTUs) for decades to come. The dramatic surge of investment in gas-fired generating resources is illustrated in Figure 7.



Source: *Memorandum: Using Existing Natural Gas Capacity to Displace Coal Generation, 2011 Update*. Synapse Energy Economics. Prepared for the Energy Foundation. August 2011. Page 3.

Figure 7. New power plant builds and retirements by year and fuel source in the United States.

The electricity market meltdown of 2000 in California, coupled with gas prices reaching $10 per million BTUs, changed this picture dramatically. Initially seen as a short-term phenomenon, the market quickly adjusted to a perception that domestic sources could not keep up with supply, and that gas prices would be $8 to $15 per million BTU for the long haul. At one point, there were applications with the federal government to build more than 40 liquefied natural gas (LNG) import terminals around the United States to cash in on this price trend and to supplement dwindling domestic resources with international supplies. Many of the natural gas power plants built in the 1990s were either mothballed or sold at bargain-basement prices, as their owners could not compete given the high cost of fuel.

Much more recently, the availability of natural gas “fracking” technology has allowed domestic producers to recover previously unreachable natural gas reserves locked in deep shale formations. Today the accepted price outlook for natural gas is of comparatively low (~$4 to $6 per million BTU) prices for years to come. But the fracking industry is young, and the environmental impacts and regulatory structure for this process has barely begun to appear. Already there are widespread concerns about groundwater pollution and even induced seismicity associated with fracking; for example, a December 2011 draft report from the EPA concludes that fracking activity

is almost certainly the source of groundwater contamination at a site near Pavillion, Wyoming.[7] Local opposition is growing in many areas. The long-term outlook for fracking remains unclear; what we do know is that the experts (and even the market) have always been wrong about the long-term price outlook for natural gas (See Figure 8), and they are almost certainly wrong again today.

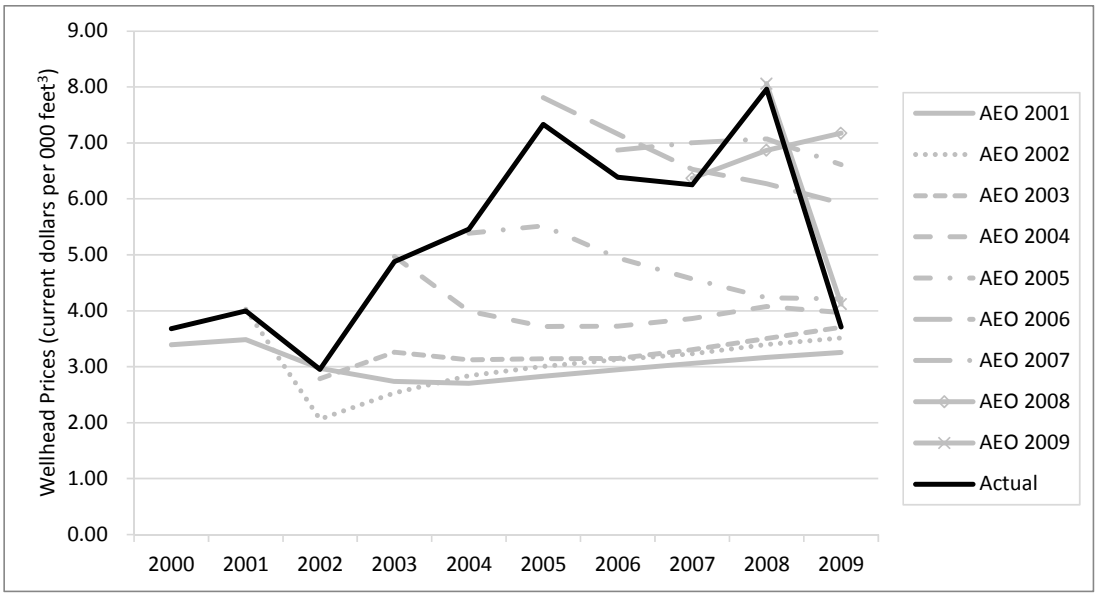


Figure 8. Historic natural gas "wellhead" prices vs. annual projections from the U.S. Energy Information Administration (EIA)

Data Source: EIA Annual Energy Outlook

The Commission's RFP articulates a concern that Maryland should be in a position to benefit, should shale gas development lead to long-term low gas prices. In fact, as part of the PJM market, Maryland would certainly benefit from this development (as the state is currently benefiting). The clearing price for energy in PJM—the energy price paid by all purchasers and to all generators—is often set by a natural gas-fired plant. If gas is cheap, then electric energy is correspondingly cheap, even if it is produced by burning coal.

The best way to ensure long-term price stability for ratepayers is to enter into long-term contracts with new resources that will be unaffected by fluctuating fuel costs or future greenhouse gas regulations. It is unlikely that a fossil fuel resource would be willing to offer this level of protection for Maryland's ratepayers without a substantial price premium for taking on the risk. Absent this protection, when the price of gas increases, the price of electric energy from gas-fired resources will increase. Similarly, if the cost of emitting greenhouse gases increases under federal regulation, the cost of all fossil-fired generation will increase, driving up the market price of electricity.

[7] US EPA, "Investigation of ground water contamination near Pavillion, Wyoming", draft report, December 2011. Available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf.

Maryland's ratepayers can be protected from these price increases by reducing their dependence on the gas price-dominated market for energy, and by encouraging long-term contracts for resources that are immune to fuel and emissions cost increases: resources such as renewables and demand-side management.

Reducing Maryland's exposure to fuel and emissions costs and risks is consistent with the goals of the Maryland legislature, which has recognized the benefits of reducing dependence on fossil fuels. For example, the Maryland Greenhouse Gas Emissions Reduction Act calls for a 25% reduction in greenhouse gas emissions relative to 2006 levels by 2020, claiming that:

> While reductions of harmful greenhouse gas emissions are one part of the solution, the state should focus on developing and utilizing clean energies that provide greater energy efficiency and conservation, such as renewable energy from wind, solar, geothermal, and bioenergy sources; it is necessary to protect public health, economic well-being, and natural treasures of the state by reducing harmful air pollutants such as greenhouse gas emissions by using practical solutions that are already at the state's disposal. (*Senate Bill 278, p.3*)

Passing this act, along with the state RPS and EmPower, are steps in the right direction; achieving their goals will require aligning the state's energy procurement practices with the demand for cleaner, more environmentally benign energy resources.

4. Maximizing Benefits for Maryland

Even with the far improved resource adequacy outlook for Maryland, the Commission may still find an interest in directing the state's utilities to procure new resources consistent with public policies and ratepayers' interests. We recommend that the Commission do so using a procurement vehicle that allows consideration of a wider range of both resource types and benefits than does the current RFP.

There is no reason to assume *a priori* that gas-fired generation is the best or most cost-effective way to meet Maryland's energy and capacity needs. In fact, it was by opening a resource procurement RFP to demand response that New England successfully solved a resource adequacy crisis in Southwest Connecticut in 2004.[8]

At bare minimum, the Commission should allow participation in the RFP from a wide range of clean, low- or zero-emissions resources, so that the merits of each can compete on a level playing field. For example, the Commission has recognized the risk of fuel price variations in its most recent amended RFP,[9] asking each respondent to submit proposals with both fixed and variable gas price terms. This will allow participants to price the risk of higher gas prices, so the Commission and the utilities can put a price on this risk and decide whether it should be borne by ratepayers or hedged through a higher energy price. But the Commission ignores a

[8] ISO New England, Inc., Final Report on Evaluation and Selection of Resources in SWCT RFP for Emergency Capability - 2004 2008.
[9] Case No. 9214, Notice dated December 8, 2011.

straightforward way of mitigating this risk: by opening the procurement process to resources that are unaffected by gas prices. Allowing these resources to participate will facilitate consideration of the full suite of options for managing gas price risk.

Similarly, in analyzing the costs and benefits to ratepayers, the Commission should factor into the price of fossil fuel generation the risk of greenhouse gas and other emission costs, to allow a meaningful comparison of fossil fuel generation and renewable generation, which lacks such risks. Following the treatment of fuel cost risk, the Commission could require that bidders offer a fixed long-term price for energy for which the seller assumes all emissions cost risk. Again, this would allow an apples-to-apples comparison of costs with renewable and demand-side resources that have no emissions cost risk.

In particular, we believe that by opening the RFP to a full range of resources the Commission may find that renewable and demand-side resources are available that will both further improve Maryland's capacity position and provide a wide range of other benefits. Specifically:

- Energy efficiency provides avoided energy and capacity cost benefits, reduction in emissions of greenhouse gases and other pollutants, and distribution system benefits;
- Renewable energy is becoming increasingly cost-competitive with natural gas due to falling capital costs coupled with zero fuel and emissions costs and risks;
- Renewable energy and energy efficiency provide significant economic development and employment benefits over natural gas that should be considered as part of the procurement process;
- Soliciting bids for renewable and load management capacity will be more in step with Maryland's environmental policy and resource development goals.

A. Cleaner, Lower-Cost, and Lower-Risk Resources

This section provides a brief description of resources that are precluded from competing in the current RFP, and presents key reasons why they should be included in any future procurement initiative.

ENERGY EFFICIENCY

Throughout the United States, the cost of saving a kilowatt-hour (kWh) of electric energy has proven lower—far lower—than the cost of generating that same kWh. Most utilities and states are finding the levelized cost of saving energy, defined as the total cost of a program divided by the lifetime savings associated with the program, in the range of 3 cents/kWh or less.[10] A recent survey of 2010 levelized costs showed 7-9 cents per kWh for energy from a new gas combined cycle plant, and 11-14 cents/kWh for a new technology coal plant[11]—several times the cost of avoiding the need for that capacity.

Maryland's EmPower program is an important and commendable step toward harnessing these cost-effective resources, but there is ample evidence that significantly greater energy savings can

[10] R. Neal Elliott, Rachel Gold, and Sara Hayes, "Avoiding a Train Wreck: Replacing Old Coal Plants with Energy Efficiency," ACEEE White Paper, August 2011.
[11] Lazard, Levelized Cost of Energy Analysis – Version 4.0, May 2010.

be achieved while extending the cost-saving and job-creating benefits of EmPower. In fact, Synapse' reviews of energy efficiency programs throughout the US[12] has shown that, at least at energy savings levels reached anywhere in the country today, there is still significant room for growth in energy efficiency. We have also found that reaching for higher levels of energy savings generally results in *lower* costs per MWh saved. This relationship, which reflects the economies of scale associated with greater learning and spreading fixed and administrative costs over larger programs, is illustrated in Figure 9.

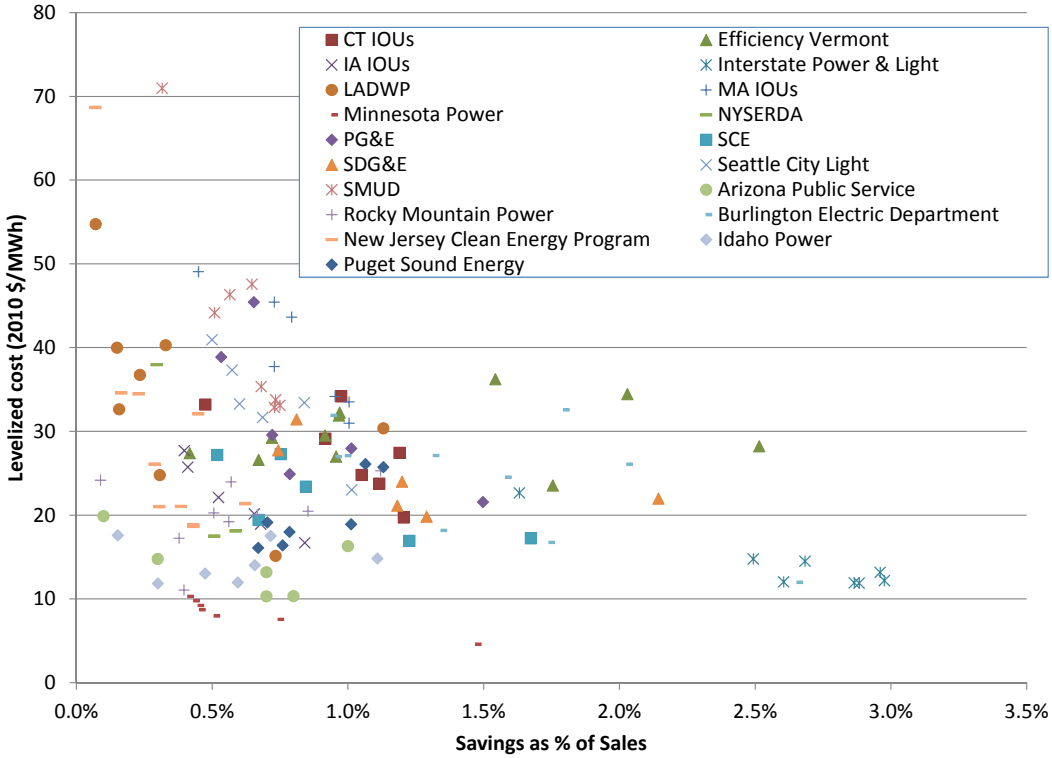


Figure 9. Relationship between costs per MWh of energy saved and first-year energy savings (%) by utility. Based on Synapse' Energy Economics compilation of utility plans, state energy efficiency plans and database of energy efficiency programs--assuming 12-year measure life when not available and 4% real discount rate for levelized costs. Trends for individual utilities are explored in the document referenced in footnote 12.

If a reasonable minimum standard for investment in energy efficiency is cost parity with fossil resources, every state in the US (including Maryland) could benefit from a much larger investment in this resource.

NEW GENERATION

As discussed earlier in this report, Maryland does not currently have a pressing need for new capacity resources—and any such future need can be forestalled at low cost through aggressive

[12] See, for example, Hurley et al., "Costs and Benefits of Electric Utility Energy Efficiency in Massachusetts", August 2008. Available at http://www.synapse-energy.com/Downloads/SynapseReport.2008-08.0.MA-Electric-Utility-Energy-Efficiency.08-075.pdf.

investments in demand-side resources. However, it is likely that new generation will be required at some point in the future to replace Maryland's aging fleet and to further reduce emissions of greenhouse gases and other pollutants. In the near-term, new renewable generation is also required to meet the state's 2022 RPS obligations.

Given these circumstances, it is critical that the Commission analyze all potential generation options and the benefits and risks that they present. A resource procurement RFP process provides the Commission with the opportunity to perform such a comprehensive analysis, and to allow the market to price the costs, benefits, and risks of various energy and capacity resources. This can be facilitated by the Commission's requesting "all-in" bids to provide a long-term, fixed capacity and energy price, following its own logic of pricing fuel price risk in the current RFP—and by allowing all resources to participate. Given the large potential costs involved, it would be illogical to bar participation from renewable resources, which are largely immune from such risks.

By asking each respondent under the current RFP to submit proposals with both fixed and variable gas price terms, the Commission has recognized that gas price risk has a cost, and that ratepayers will have to either face this risk, or pay up-front for the supplier to assume this risk. But the revised RFP still fails to provide an adequate basis for analyzing the risks of emissions costs. Applicants are asked to propose treatment of greenhouse gas emissions costs, but it is not specified whether these and other emissions costs and risks should be borne by the seller or the ratepayer. A meaningful comparison of different generation resources, and of potential ratepayer impacts, will require that bids factor into a fixed price a future emission cost for greenhouse gases and other pollutants.

We find that under circumstances of aggressive federal greenhouse gas regulation and/or higher gas prices, Maryland ratepayers could be better served by increased assimilation of renewable energy resources rather than by expanded reliance on natural gas. In Figure 10 we illustrate this dynamic: we have shown our estimation of the gas and emissions costs at which renewables reach "cost parity" for energy with a gas-fired combined cycle (CC) plant under various renewable cost scenarios. Not surprisingly, under higher carbon emission price scenarios, renewables become cost competitive at progressively lower gas prices.

The low wind cost scenario shown in Figure 10 is based on an installed cost of $1,400 per kW consistent with the cost of the wind projects installed in the U.S. during the period 2001 through 2005. The high cost scenario is based on an installed cost of $2,000 per kW. A number of factors, including turbine prices and currency exchange rates, combined to make 2001 through 2005 a particularly favorable period for U.S. wind development. After this period, wind costs rose, peaking at about $2,150 per kW in 2010. However, both turbine prices and early data from 2011 installations suggest that costs are coming back down. It is difficult to predict where wind costs will be in the 2015 – 2020 period, but it is quite likely that they will be in the range of $1,400 to $2,000. We assume a net capacity factor for new wind in the Eastern and Northeastern U.S. of 28.5%, based on data from plants currently operating in this region. The levelized cost of wind energy is $46 per MWh in our low-cost scenario and $69 per MWh in our high-cost scenario. These costs are net of the $22 per MWh production tax credit (PTC), assuming the PTC is reauthorized by Congress at this level. Because these are total levelized costs, we would expect developers to be willing to sell both energy and RECs at these prices.

The cost of photovoltaic (PV) systems has come down dramatically since 2009, largely due to reductions in module prices. In 2008, average PV module prices were close to \$4.00 per W_{DC}. By the end of 2011 many modules were being sold below \$1.50 per W_{DC}, with some sales documented in the range of \$1.10 per W_{DC}. With a module cost of \$1.10 per W_{DC}, we estimate a total installed cost around \$2.60 per W_{DC} for 2011. With a 20% capacity factor (consistent with insolation levels in Maryland), levelized costs would be in the range of \$190 per MWh, or \$168 per MWh with the PTC. Our low PV cost scenario assumes an average module cost of \$0.90 per W_{DC} in the 2015 – 2020 period and a total installed cost of \$1.90 per W_{DC}. The total levelized cost is \$140 per MWh, or \$118 with the PTC. Our high-cost PV scenario (not shown in Figure 10) assumes a module cost of \$1.45 per W_{DC} and a total installed cost of \$2.75 per W_{DC}. The levelized cost is \$195 per MWh, or \$173 with the PTC. Again, developers would be expected to sell both energy and RECs at these prices.

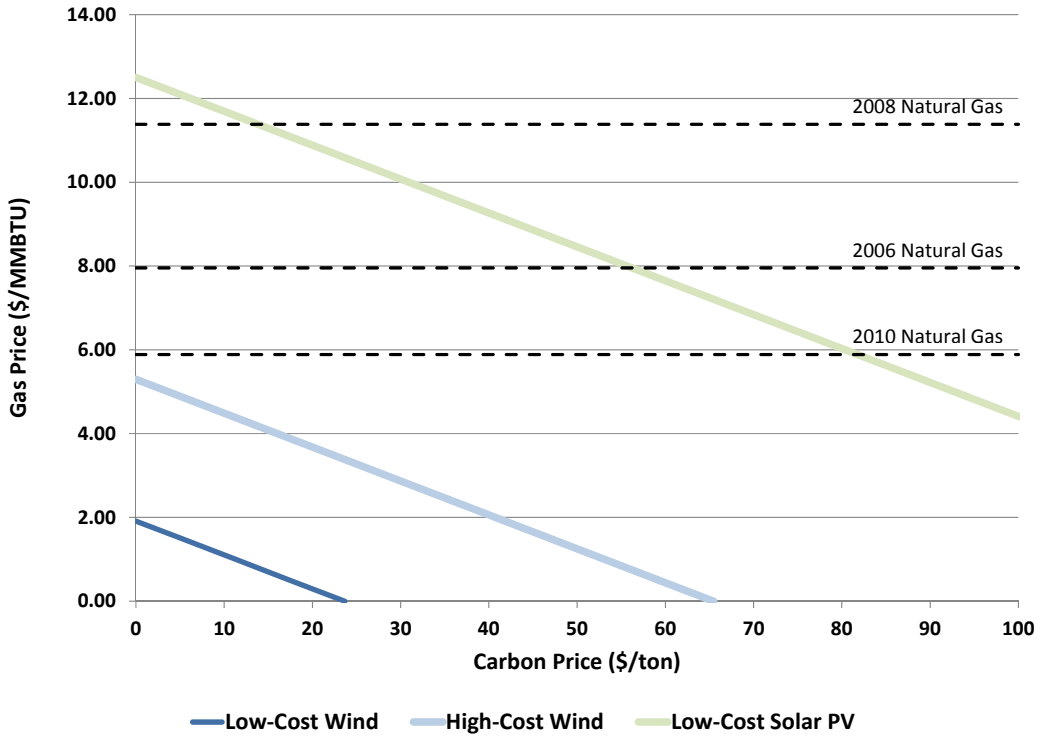


Figure 10. Levels of cost parity with natural gas for wind and solar resources based on fuel and carbon prices. Each line represents, for the indicated renewable resource and cost, the combinations of natural gas and carbon emissions prices above which the resource would be less costly than a natural gas CC. For reference, the dashed horizontal lines show regional delivered price of natural gas for electricity generation for three representative years.

Of course, we cannot know with certainty the cost of energy for any future project serving Maryland, and neither can the Commission. But by limiting the RFP to gas resources only, the Commission misses the opportunity to learn what the options are, and to weigh their relative price and non-price merits on an informed, balanced basis.

B. Maximizing Economic Benefits

Investments in energy efficiency and renewable energy have been shown to create more jobs per unit of energy when compared to traditional fossil fuel generation such as natural gas and coal. According to a 2010 comprehensive survey of job impacts by resource type in the United States,[13] the natural gas industry creates 0.11 jobs in operations and maintenance and 1.02 jobs in construction per MW, while wind jobs range between 0.14 and 0.40 for operations and maintenance and between 2.5 and 10 jobs in construction per MW. The solar industry typically creates more jobs per MW than wind, primarily because it consists of smaller projects that require more contracts to achieve the same amount of energy—the lowest figure cited for solar in this study was 7.14 jobs per MW. Another study, focused on solar benefits in New Jersey,[14] cited job impacts as high as 35 jobs per MW compared to 3 jobs per MW for natural gas and 7 jobs per MW for wind. A 2008 study by ACEEE on energy efficiency potential in Maryland[15] estimates 1.5 jobs per MW of peak demand savings in 2015.

Energy efficiency and renewable energy also produce many more local jobs than do investments in fossil fuel burning resources. There are several reasons for this:

- Energy efficiency is the cheapest resource available, at a fraction of the cost per kWh compared to fossil-generated electricity;[16] As discussed above, many renewable technologies are also likely to be cost competitive with natural gas generation in the long term.[17] This long-term cost savings accrues for ratepayers in the region.
- As households and businesses save on energy costs through efficiency measures, individuals can spend additional money in the local economy and businesses can re-invest their savings, both of which spur job growth.
- Clean energy investments require production, installation, and operation of new equipment (such as new boilers, wind turbines, and solar panels) generating both short and long-term employment. The impacts of these investments are more likely to be felt in-state than spending on fossil fuel generation, especially since Maryland acquires most of its natural gas and other fossil fuels from out of state.
- Renewable and energy efficiency projects also tend to be more labor-intensive than traditional generation, creating more jobs per dollar spent and per unit of energy produced.

C. Recommended Criteria for Selecting Bids of New Capacity and Energy

Allowing cleaner, more price-stable resources to compete with gas-fired resources would provide benefits to Maryland citizens by allowing for more competition for bids of capacity and energy, and

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[13] Wei, Max, Shana Patadia, and Daniel Kammen, "Putting Renewables and Energy Efficiency to Work: How Many Jobs Can the Clean Energy Industry Generate in the US?" Energy Policy 38 (2010), 919-931.
[14] Peter, Niklas, "Promoting Solar Jobs: A Policy Framework for Creating Solar Jobs in New Jersey," January 5, 2010.
[15] ACEEE 2008.
[16] Elliott et al., 2011.
[17] Synapse Energy Economics, 2011.

evaluation of these bids should be based on a broader view of ratepayer benefits. Specifically, we recommend the following overall criteria for selecting bids of new capacity and energy:

- **Cost to Ratepayers,** including cost of capacity and energy from each resource, and the expected overall impact of the new resources on the cost of capacity and energy in Maryland;
- **Risks for ratepayers,** associated with dependence on fossil fuels, fuel price uncertainty and volatility, and future costs of emissions of CO_2 and other pollutants;
- **Environmental quality and reliability benefits,** such as allowing outdated coal plants to retire, and avoiding the need for future Reliability-Must-Run (RMR) designations;
- **Reduced need for new transmission** by locating new, clean resources closer to load, and relying on demand side measures, which help to reduce congestion and line losses;
- **Non-monetary costs and benefits**, such as those associated with protection of air and water resources and human health;
- **Contribution to meeting Maryland's goals** for renewable energy (the RPS requirement) and energy efficiency (EmPower);
- **Reducing greenhouse gas emissions** consistent with Maryland's Greenhouse Gas Emissions Reduction Act;
- **Employment and other direct and indirect economic benefits for Maryland.**

We anticipate that a comprehensive framework for evaluating capacity, with full consideration of these benefits, would support a larger role for renewable energy and demand-side resources for Maryland. This is consistent with the Legislature's intent in promoting these resources through the RPS and EmPower; it is also consistent with ratepayer interests as described to the Commission by Governor Martin O'Malley.[18]

As noted above, the minimum first step for the Commission to recognize these benefits would be to allow participation in the RFP from a wider range of resources, so that their merits can compete on a level playing field.

5. Conclusions

The Commission should refrain from procuring new resources under the current capacity and energy RFP for two reasons: first, the RFP is predicated on an outdated and limited analysis of Maryland's capacity needs; second, it does not serve ratepayer interests to limit new capacity procurement to natural gas, thus depriving the Commission and Maryland ratepayers of even the opportunity to consider the benefits of alternative capacity and energy solutions.

The state's resource adequacy picture has improved markedly since the alarming note sounded by PJM in 2007 and 2008—new transmission has come on line, Maryland's load management programs have begun to bear fruit, and new demand response resources have become available to help meet peak demand. Given the ambitious goals of Maryland's EmPower and RPS

[18] Comments of Governor Martin O'Malley, Case 9214, December 18 2009; Letter from Governor O'Malley to the Commission dated October 20, 2011.

programs, there is every reason to believe that resource adequacy will not be a significant problem for quite a while—and that RPM prices will no longer subject Maryland and SWMAAC ratepayers to higher capacity costs than ratepayers in the rest of PJM.

Despite the lack of an impending reliability crisis, Maryland does have a compelling long-term interest in directing resource development in the state that can meet a number of public policy objectives, including ensuring long-term resource adequacy and system reliability. The Commission can and should try to maximize this broad range of benefits, especially given that any pressure to avert a capacity shortfall has been relieved. In recognition of the risks posed by uncertainty in future fuel and emissions costs, the Commission should seek long-term, fixed-priced bids that do not subject Maryland ratepayers to these risks.

In this report, we have identified criteria for the Commission to ensure the maximum benefit for ratepayers from Maryland's capacity and energy procurement initiatives. We anticipate that such a comprehensive framework for evaluating capacity would highlight the considerable benefits of a strong role for renewable energy and demand-side resources for Maryland, consistent with the Legislature's intent in promoting these resources through the RPS and EmPower. However, the minimum first step for the Commission to recognize these benefits would be to discontinue the current RFP process, so that the merits of a wider range of resources can compete on a level playing field. Absent this, Maryland ratepayers could be saddled with excess costs for resources that are not needed, and that do not reflect their combined interests in reliability, reasonable cost, risk reduction, environmental protection, and economic development.

The Commission and the state should take this opportunity to promote a cleaner, healthier electric generation fleet for Maryland, decreasing the state's CO_2 emissions and reducing long-term risk for the state's ratepayers.