Georgia Power Company Should Retire Plant Hammond

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Executive Summary

Georgia Power should retire Plant Hammond, an 840-megawatt (MW) coal-fired power plant in Northwest Georgia.

The plant, whose four units are from 44 to 61 years old, has grown increasingly expensive for ratepayers in recent years. The higher costs are caused both by a decrease in generation at the plant and by significantly higher variable costs (fuel and non-fuel operations and maintenance).

The amount of power generated by Plant Hammond has declined precipitously since 2007, when natural gas prices collapsed. As a result, electricity that probably would have been generated by Plant Hammond has been displaced by electricity produced at lower-cost natural gas-fired plants.

There is little reason today to expect the amount of power generated at Plant Hammond to recover. This is true for several reasons:

- Natural gas prices are likely to remain very low for the foreseeable future;
- Georgia Power is on track to add 1,000 MW of new solar capacity by 2016 and more than 1,000 MW of new nuclear capacity by the early years of the next decade;
- There is little evidence to suggest that the company's peak demands and energy sales will increase substantially in coming years.

The cost of generating power at Plant Hammond already is very high compared to the cost of purchasing power from other plants. More important, due to dramatic declines in the cost of adding new solar and wind capacity, power generated by Plant Hammond already is much more expensive than buying power from utility-scale solar and wind projects through long-term (15- to 25-year) power purchase agreements. And the cost of generating power at Plant Hammond is likely to rise even higher in coming years as a result of costly upgrades to add cooling towers and effluent treatment controls.

In fact, by buying power from renewable sources rather than continuing to generate it at aging fossil-fired plants like Plant Hammond, Georgia Power will produce significant benefits for its customers and for the environment.

Plant Hammond is similar in several respects—in its coal burning technology, its age, its recent operating performance, and its recent production costs—to other plants Georgia Power has either retired in the past year or so or has announced it will retire.

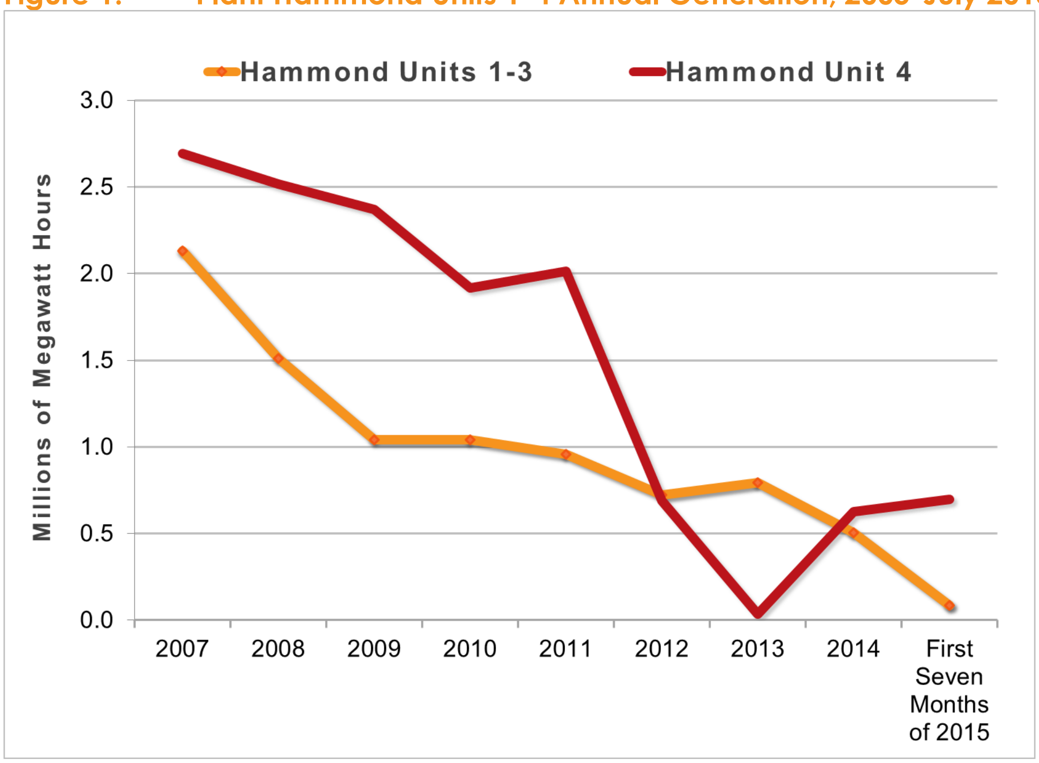
Background

Georgia Power Company's Plant Hammond is a four-unit coal-fired power plant located in northwest Georgia on the Coosa River in Floyd County, 10 miles west of Rome, Ga. Plant Hammond is capable of generating 840 megawatts (MW) net at full power. Its three smaller units, Units 1-3, each capable of generating 110 megawatt (net), began service in 1954 and 1955. Its largest unit, Unit 4 (510 MW net) began service in December 1970.

The Amount of Electricity Generated at the Plant has Declined, and Is Not Likely to Bounce Back

The amount of power generated by Plant Hammond has declined precipitously since 2007. The plant operated as a baseload unit through 2008, meaning that it was designed to provide electricity around the clock. However, its generation has been declining since then, except for when it increased slightly in 2014 due to the polar vortex event that year.

Figure 1: Plant Hammond Units 1-4 Annual Generation, 2005-July 2015.[1]

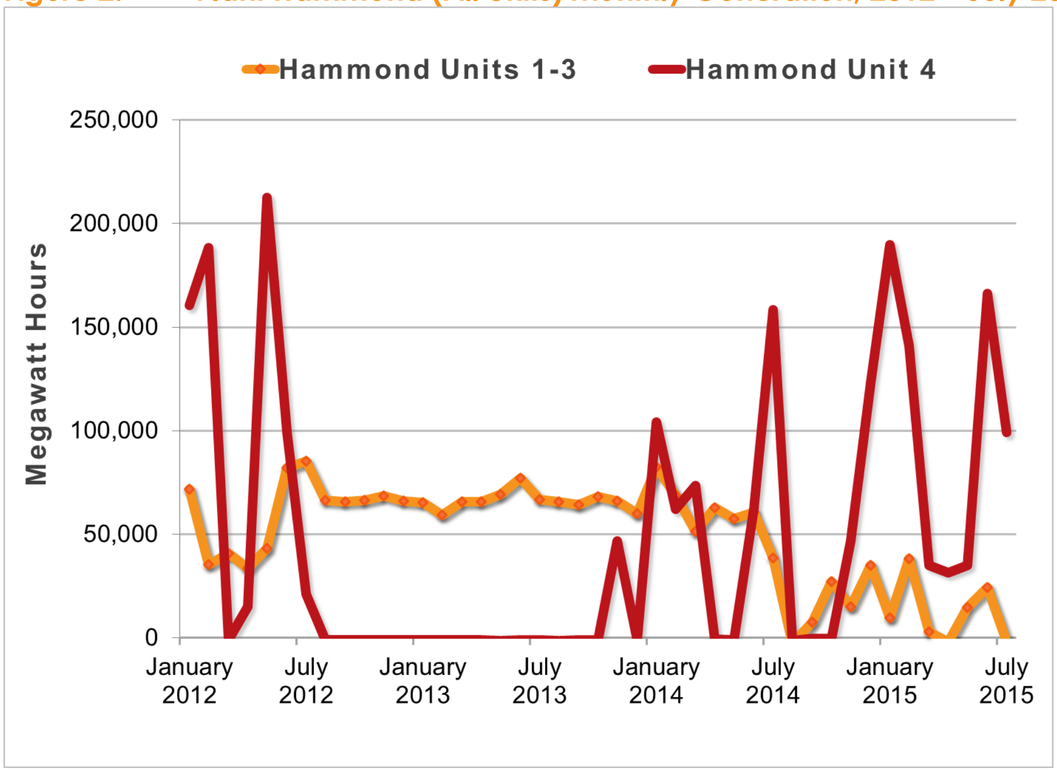


[1] Source EIA Form 923 data, as reported by SNL Financial.

As shown in Figure 1, even the amount of power generated by the younger Unit 4 has declined significantly since 2008, except for a slight uptick in early 2014.

A closer look at month-by-month generation over the past three years, as seen in Figure 2, shows that Units 1-3 have essentially generated only very small amounts of power in any given month. Unit 4, the largest and newest unit, has essentially become a "peaker," producing the greater portion of its output in the high-demand summer and winter months, with little to no generation the rest of the year.

Figure 2: Plant Hammond (All Units) Monthly Generation, 2012 – July 2015.[2]



A power plant's "capacity factor" compares how much power a plant actually generates in a specific time period with how much power the plant would have produced had it operated at full power for that entire time period. Although a baseload power plant, like Plant Hammond used to be, typically operates at an average 60 to 80 percent capacity factor each year, Plant Hammond's generation has declined so substantially that the plant has averaged only a 16 percent capacity factor since the beginning of 2012.

The major cause of this decline in generation has been market competition from natural gas. Gas prices collapsed in 2008 and have remained low ever since, as shown in Figure 3. As a result, electricity that likely would have been generated by Plant Hammond has been displaced by electricity produced at lower-cost natural gas-fired plants.

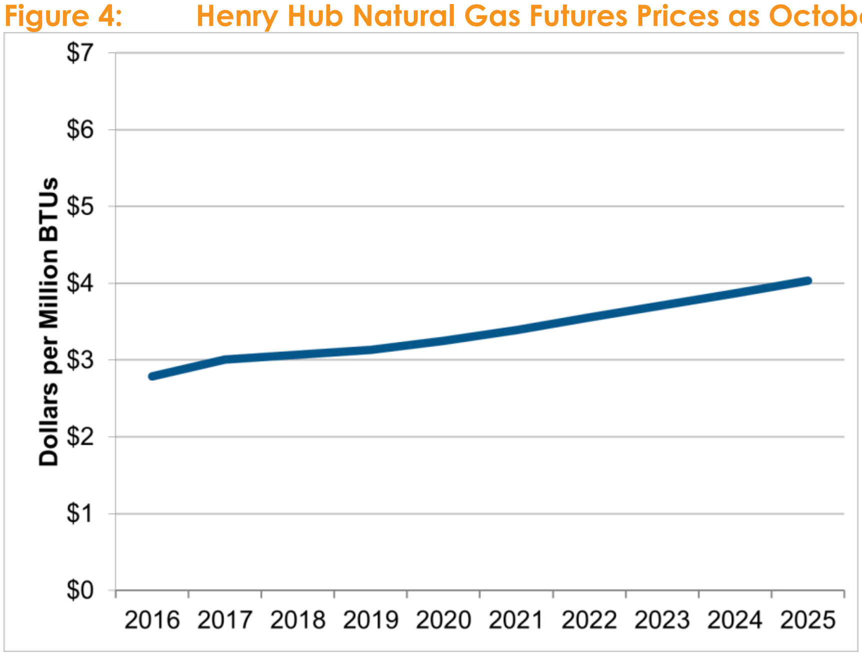
2 Source EIA Form 923 data, as reported by SNL Financial.

Figure 3: Henry Hub National Gas Prices, 1997-2014.[3]

This trend is not likely to be reversed, for a number of reasons:

First, natural gas prices are expected to remain very low, between $3 and $4 per MMBTU, for the foreseeable future, as shown in Figure 4, below. This will mean that generation from lower-cost natural gas-fired plants will continue to displace power that would have been produced instead at existing coal-fired units like Plant Hammond.

Figure 4: Henry Hub Natural Gas Futures Prices as October 12, 2015.



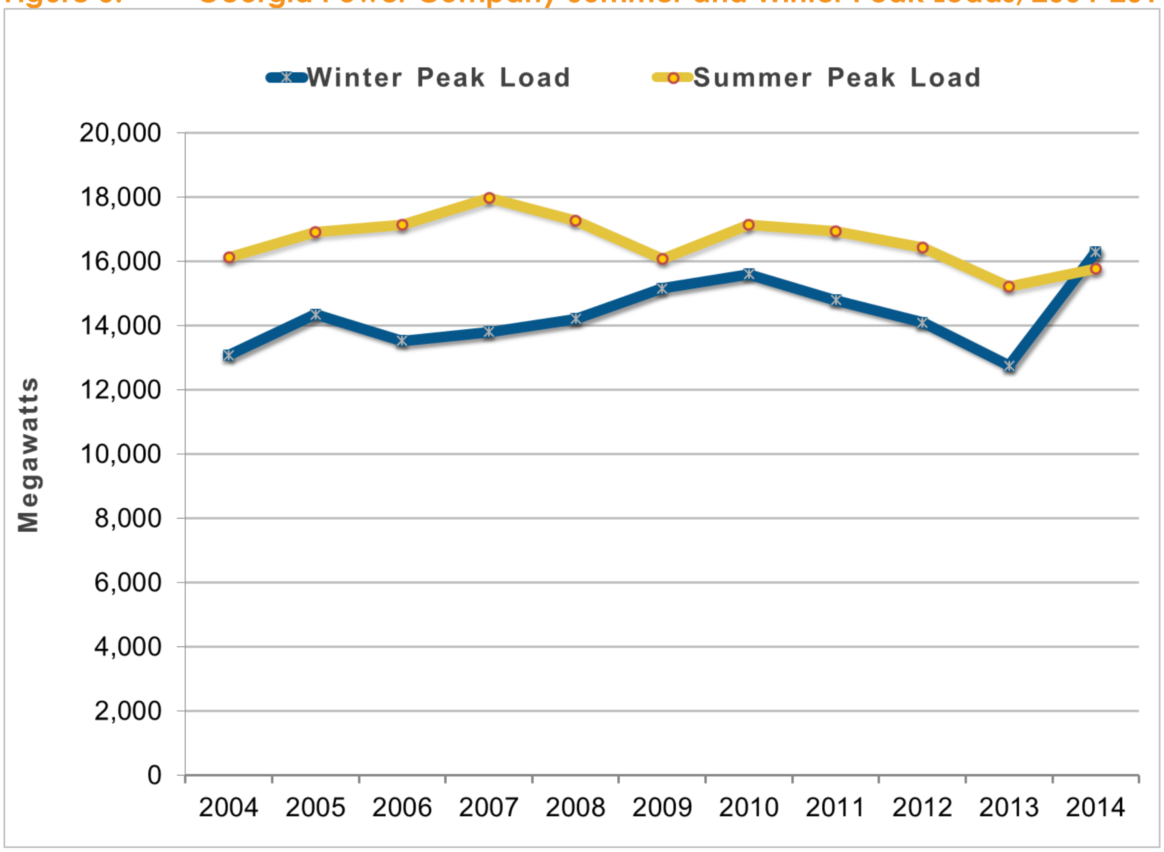
[3] The Henry Hub is a natural gas pricing location in Louisiana.

Second, Georgia Power, at the direction of the Georgia Public Service Commission, is on track to add more than 1,000 MW of new solar capacity by 2017. This new solar capacity will generate its power during many of the same peak summer demand times during which Plant Hammond's output has been the highest. Because solar has no variable operating costs, it can be expected to displace the higher cost power generated at Plant Hammond.

Third, Georgia Power's 1020 MW share of two new units at the Vogtle nuclear plant—when they come on-line by the end of this decade (or soon thereafter)— can be expected to further replace generation from Plant Hammond.

Finally, it seems unlikely that Plant Hammond might be used to meet increasing power demands. Georgia Power's peak demands and energy sales have essentially been flat for the past ten 10 years, except for the unique polar vortex event in early 2014. Georgia Power's summer peak loads actually declined by 352 MW, or 2.2 percent, between 2004 and 2014, as shown in Figure 5, and its annual energy sales increased by only 1.7 percent over that 10 year period.

Figure 5: Georgia Power Company Summer and Winter Peak Loads, 2004-2014.

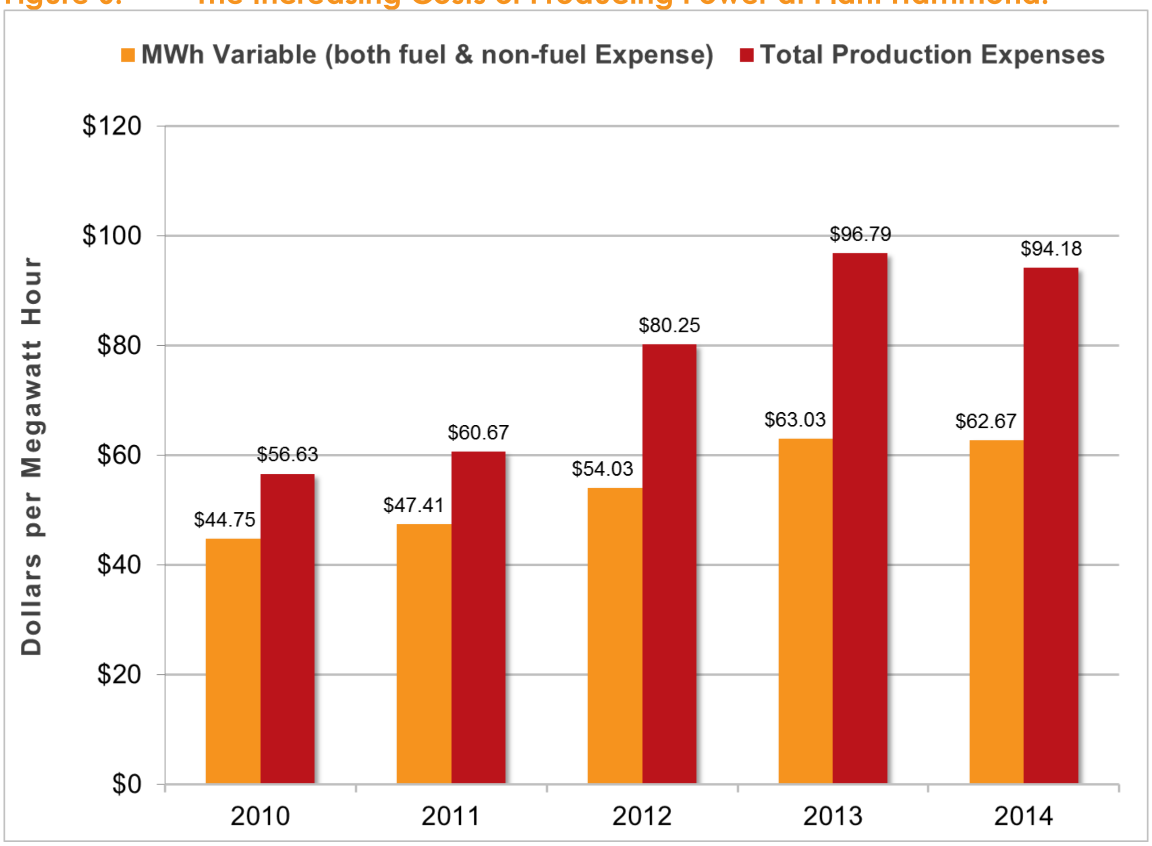


In sum, there isn't much reason to expect that Plant Hammond will generate more power than it has generated in recent years. Indeed, it is most likely that Plant Hammond will continue to operate as a seasonal peaking unit and that its generation will remain very low except, perhaps, for very unusual circumstances like the 2014 polar vortex event.

Plant Hammond is Becoming Increasingly Expensive to Operate

The annual per-megawatt-hour (MWh) costs of generating power at Plant Hammond have increased by about two-thirds since 2010, as is shown in Figure 6. This is due in part to the decline in total plant generation that was shown in Figure 2. However, in large part, increased cost of producing power at Plant Hammond is due to a 41 percent increase in the plant's variable fuel & non-fuel operations and maintenance (O&M) costs.

Figure 6: The Increasing Costs of Producing Power at Plant Hammond.

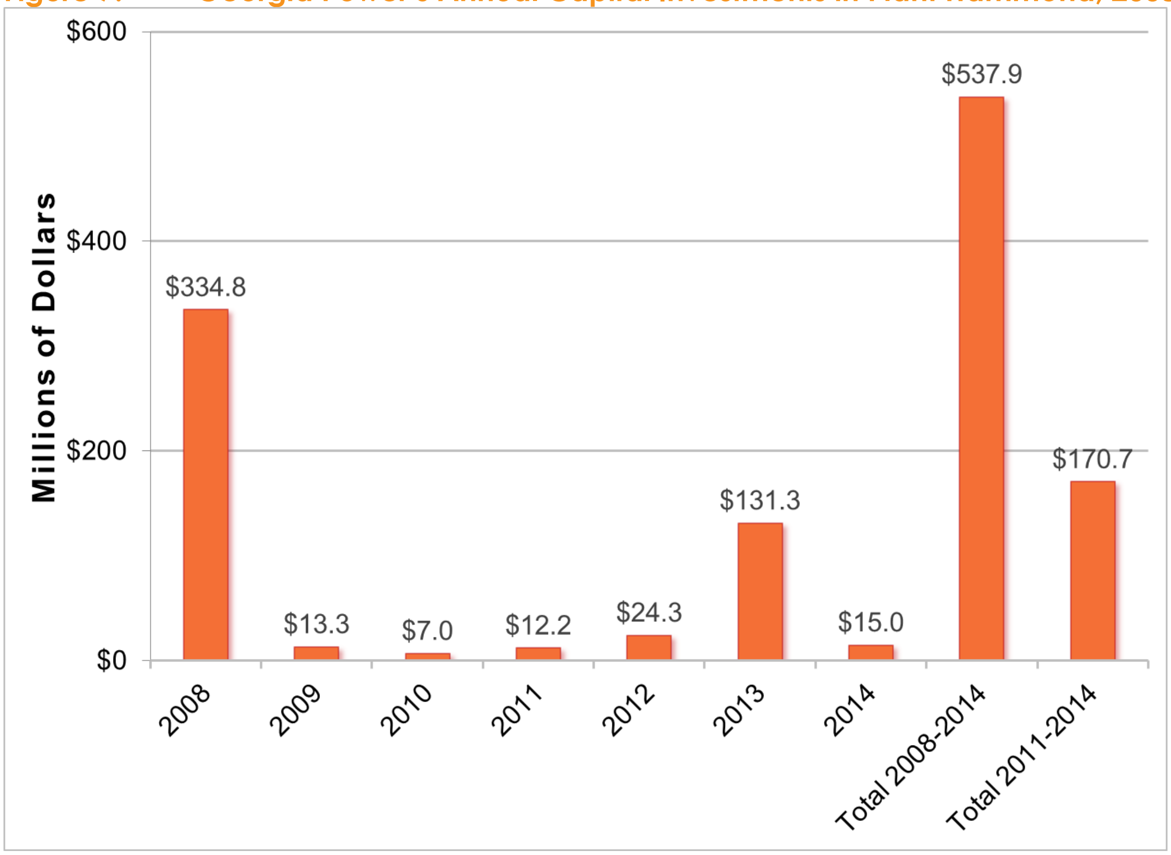


As will be explained below, the cost of producing power at Plant Hammond is much more expensive than the costs of feasible alternatives that include purchasing power from other generators, investing in solar and wind capacity, and making larger investments in energy efficiency.

However, the annual fixed and variable production expenses presented in Figure 6 do not represent the total cost that Georgia Power's customers pay for power from Plant Hammond. Customers also pay a return on the funds that the company spends each year on capital expenditures to upgrade or replace the plant's equipment, structures and components. And the company's customers will continue to pay this return on capital expended on Plant Hammond for decades. This return on invested capital includes both the cost of the debt borrowed by Georgia Power as well as the profit earned by the company's sole owner, Southern Company. The more Georgia Power spends on capital projects at Plant Hammond, the higher the profits earned by both Georgia Power and Southern Company.

Georgia Power's yearly capital expenditures on Plant Hammond are significant, as seen in its annual filings with the Federal Energy Regulatory Commission, which show that Georgia Power has spent almost $540 million on capital projects at the plant since the beginning of 2008.

Figure 7: Georgia Power's Annual Capital Investments in Plant Hammond, 2008-2014.



Further, Georgia Power's $170 million of capital expenditures at Plant Hammond after 2010 represent an especially wasteful investment because by that year Georgia Power should have recognized that Plant Hammond would continue to generate significantly less power due to the precipitous decline in natural gas prices that began in 2009. Instead, the company continued to pour its customers' money into Plant Hammond even as the plant's generation declined and as evidence mounted that there was not likely to be any recovery. It did so because these capital investments created larger profits for both Georgia Power and the Southern Company.

The already-expensive power from Plant Hammond can be expected to grow even costlier in coming years. New capital expenditures and increased annual O&M expenses will be needed to meet the requirements of the U.S. EPA's new Coal Combustion Residuals Final Rule and Effluent Limitations Guidelines. In addition, the anticipated requirement to convert Plant Hammond to a closed-cycle cooling system by adding a cooling tower also will lead to expensive new capital expenditures— perhaps as much as $100-$200 million — higher plant operating costs, and reduced power output and generation. All of these added costs will make continuing operation of Plant Hammond even more uneconomic than retiring the unit and aggressively developing renewable solar and wind resources and energy efficiency measures.

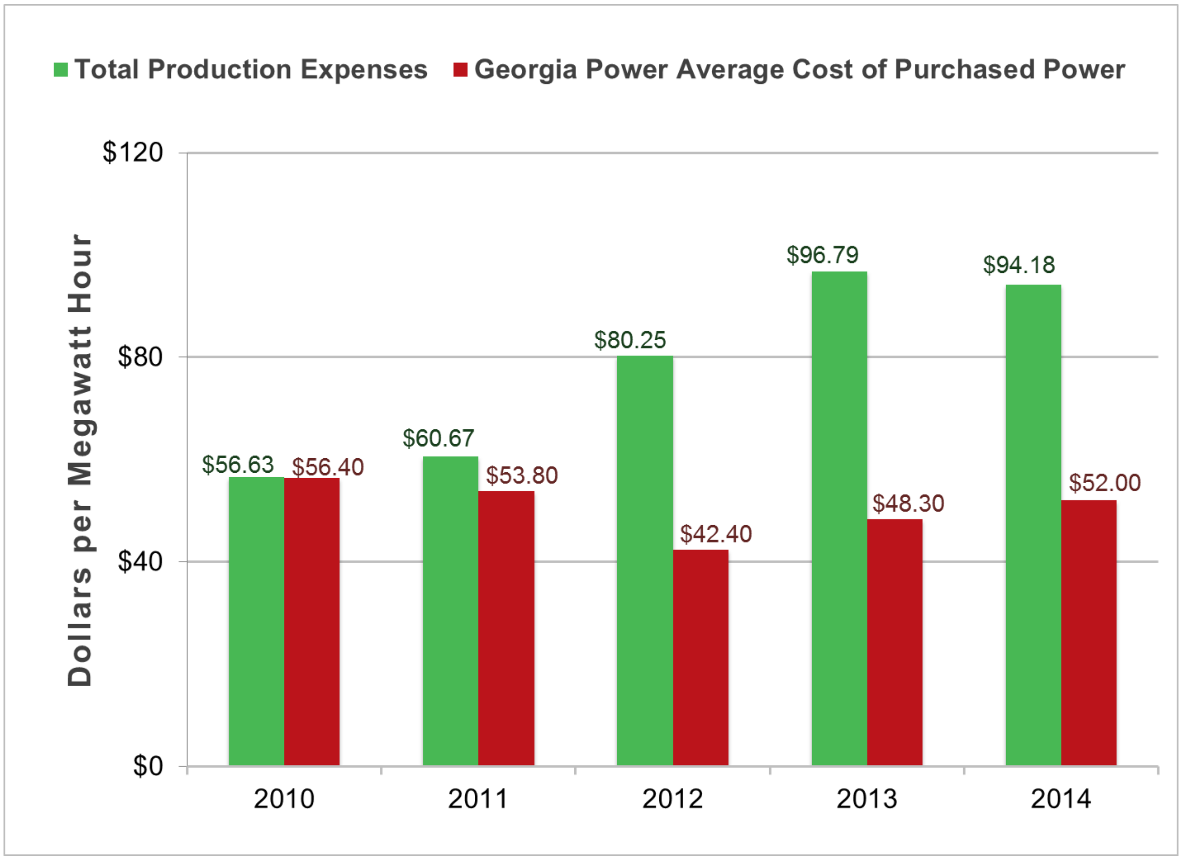
Georgia Power Has Lower Cost Alternatives Than Continuing to Operate Plant Hammond

If Georgia Power decides to retire Plant Hammond, it has a number of ways to proceed. A reasonable resource strategy would be to purchase any needed power from existing combined-cycle gas-fired plants in the short term and to invest in solar and wind capacity and energy efficiency programs for the long term.

A. Short-Term Alternative: Purchased Power from Other Plants

At the same time that the costs of generating power at Plant Hammond have been rising substantially (as shown in Figure 6, above), Georgia Power's average cost of purchasing power has not increased since 2010. As a result, the cost of producing power at Plant Hammond has become much more expensive than buying power from another plant, as shown in Figure 8.

Figure 8: Average Production Costs – Plant Hammond vs. Georgia Power Average Cost of Purchased Power.



The great disparity in recent years between the high cost of generating power at Plant Hammond and the cost of buying power generated at other, mainly natural gas-fired, combined-cycle plants, can be expected to grow even larger in the years ahead. This is because the cost of generating power at Hammond will probably continue to increase while natural gas prices are currently expected to remain low for at least the next five to ten years (See Figure 4, above). Consequently, replacing generation from Plant Hammond in the short term with purchased power would be cost-effective for Georgia Power's customers.

B. Short and Long-Term Alternative: Investing in Solar and Wind Energy and in Energy Efficiency Makes Economic Sense

Investing in renewable resources provides significant economic and environmental benefits over continuing to spend money continuing to operate aging coal-fired power plants like Plant Hammond. These benefits include:

- Cost savings that stem from the fact that with renewable solar photovoltaic (PV) and wind resources, the fuel is free;
- Renewables have no fuel price uncertainty, thus no risk of rising fuel prices as with fossil fuels;

- Cost savings from avoiding operations and maintenance costs for the fossil fuel plants; and
- Significant environmental and health benefits (lower greenhouse gas, sulfur dioxide, nitrogen oxides, small particulate, and other emissions and fewer toxics in the water) because the environmental footprints of solar PV and wind are considerably smaller than that of fossil fuel-based generation.[4]

Distributed solar PV investments provide additional benefits that include:

- Generation capacity savings;
- Avoided power purchase costs;
- Reduced need for new capital investments in the transmission and distribution system; and
- Reduced transmission and distribution system line losses.

A further argument against continuing to operate Plant Hammond is that it emits approximately 2,000 pounds of carbon dioxide for each MWh of power it generates. Retiring the plant and replacing the power it provides with non-emitting renewable solar and wind energy would assist the state of Georgia in meeting the requirements of the EPA's Clean Power Plan.

Investing more in energy efficiency would produce similar benefits.

Solar Energy

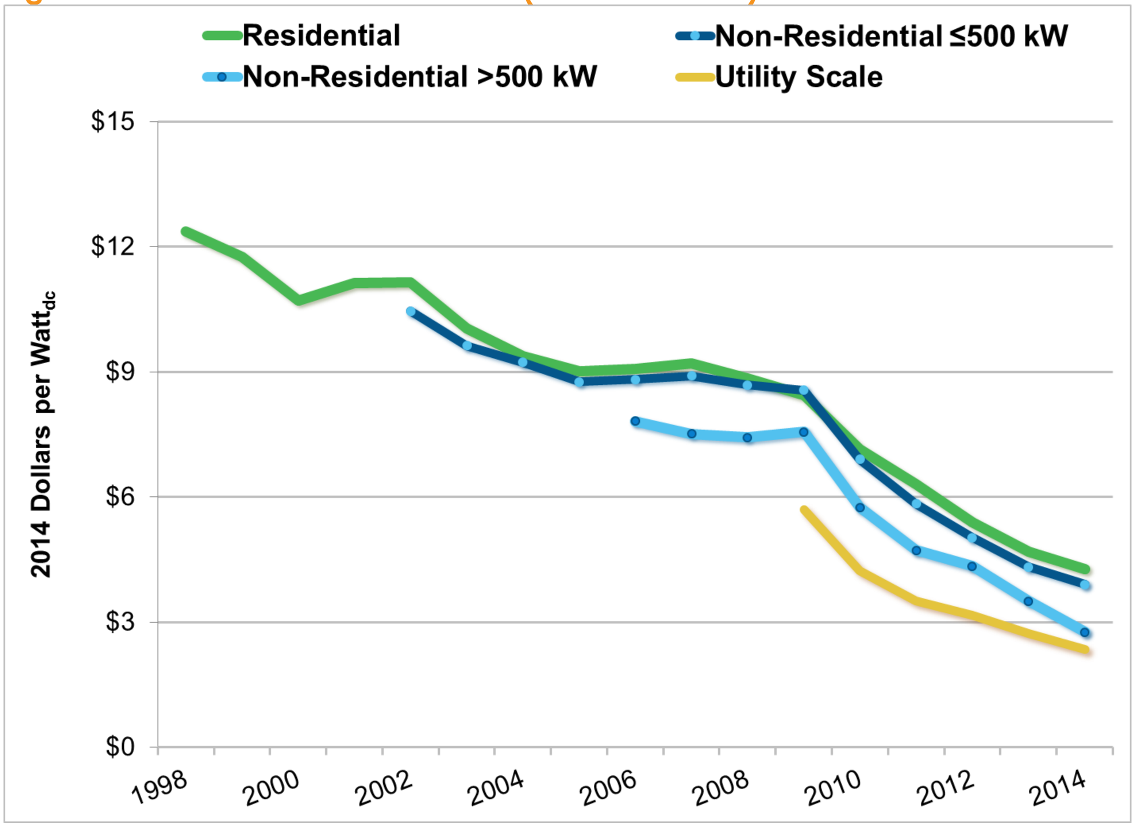
Georgia Power has taken steps in recent years to add new solar capacity to its fuel mix, and it can and should increase these investments considerably.

Further diversifying its resource mix, by retiring Plant Hammond while more aggressively investing in larger utility-scale solar PV projects and encouraging customer investment in rooftop distributed solar PV capacity and energy efficiency, would be reasonable, considering that:

- Installation prices for utility-scale solar projects and for distributed residential and commercial solar PV have plummeted in recent years. As shown in Figure 9, distributed solar PV installation prices decreased by an average of 6 percent to 8 percent per year from 1998 through 2013, dropping an additional 9 percent from 2013 to 2014. Preliminary data suggests similar price declines in the first half of 2015. Median utility-scale solar PV installation prices fell by more than 50 percent between 2007-2009 and 2014.

4 See, for example, *Designing Austin Energy's Solar Tariff Using a Distributed PV Value Calculator*, Karl Rebago, et al, available at http://rabagoenergy.com/files/value-of-solar-rate.pdf; *Designing Distributed Generation Tariffs Well: Fair Compensation in a Time of Transition*, Regulatory Assistance Project, November 2013, available at www.raponline.org; *A Review of Solar PV Benefit and Cost Studies*, the Rocky Mountain Institute, September 2013, at page 22, available at http://www.rmi.org/elab_empower.

Figure 9: Solar PV Installation Prices (Median Values).[5]



Solar installation prices are expected to continue to decline, with some analysts projecting prices as low as $1.50 to $3 per watt by 2016 and additional declines expected after 2016.[6]

The prices for long-term power purchase agreements (PPAs) from utility-scale solar PV projects have fallen so dramatically since 2009 that the median PPA price in the U.S. is now just below $50 per MWh. These lower prices can be reflected in Figure 10, below, which compares the current cost of operating and maintaining Plant Hammond with (1) the median cost of utility-scale solar PV PPAs signed in 2014 and so far in 2015, (2) the cost of a recent PPA signed by TVA and (3) the cost of a PPA recently signed by the municipal utility system in Orlando, Fla.

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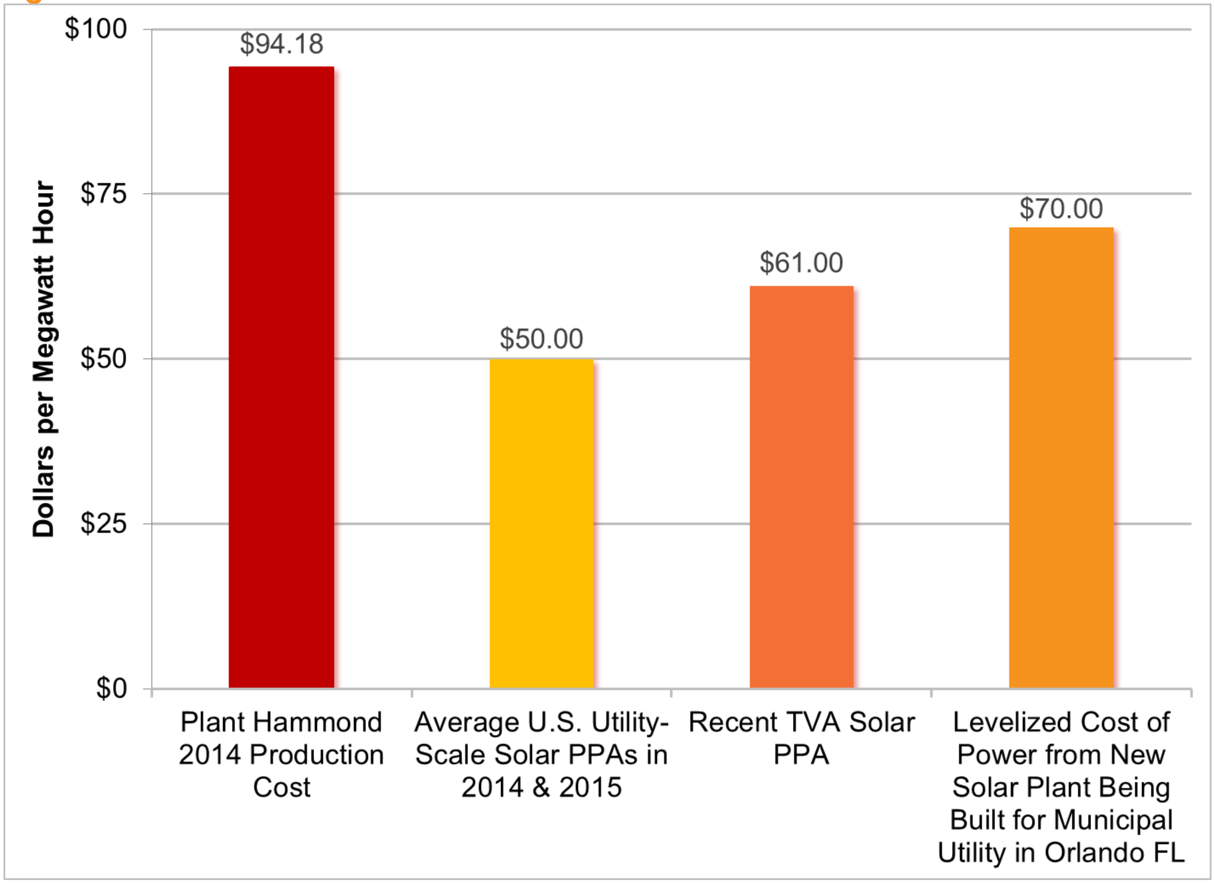
5 *Tracking the Sun VIII: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2014*, Lawrence Berkeley National Laboratory, August 2015, at Figure 7.

6 *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections, 2014 Edition*, researchers at the National Renewable Energy Laboratory and the Lawrence Berkeley National Laboratory, September 17, 2014, at slides numbers 5 and 26-28.

Figure 10: The Price of Power from Plant Hammond vs. Recent Solar PV PPA Prices.



As can also be seen in Figure 10, the cost of buying power through a long-term solar PPA already is significantly cheaper than continuing to produce power at Plant Hammond.

- The new solar PPAs being signed for power from utility-scale projects are typically long term (15-25 years) and their costs are levelized, which means the costs remain the same from year to year. This means these costs actually decline in nominal terms. This is the opposite of the cost of power from Plant Hammond, which can be expected to increase, perhaps quite substantially, each year. Moreover, as noted above, there is no risk of volatile fuel prices with solar PPAs because the fuel they use is free.
- A state-by-state analysis by the National Renewable Energy Laboratory of the U.S. Department of Energy has found that Georgia has very significant solar PV potential, with the technical potential for 24,000 MW of utility-scale solar PV and 25,000 MW of rooftop solar PV capacity and a total technical potential for over 74 million MWh of energy generation from these renewable sources.[7]

7 *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis*, NREL, July 2012, at page 12.

Wind Energy

Wind turbine prices have declined substantially even with increases in hub heights and larger rotor diameters. Such changes have combined with improved turbine technology to reduce project costs and wind PPA prices.[8] As a result, the prices for power from Wind PPAs have dropped to all-time lows, declining from $70/MWh for PPAs executed in 2009, to a nationwide average of around $23.50/MWh for PPAs signed in 2014.

In February 2015, Georgia Power submitted a report to the Georgia Public Service Commission on the responses it had received to a Wind Request for Information (Wind RFI) that it had issued to determine the availability and price of wind energy.[9] The consulting firm, LaCapra Associates, reviewed the results of the Wind RFI for the Commission and noted the following:

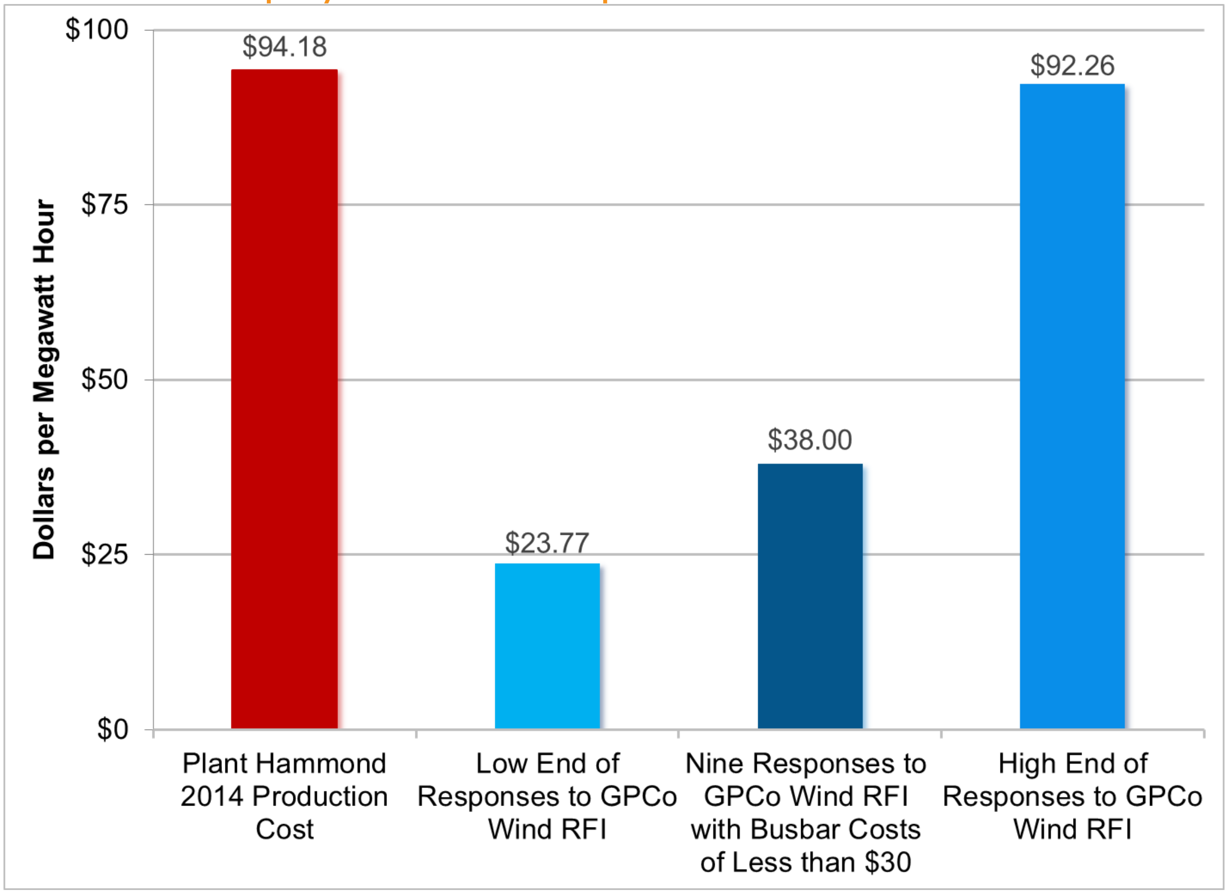
- 26 responses, involving over 6,500 MW of wind capacity, were received from 14 different companies.
- That the prices provided in response to the Wind RFI ranged from $15.77 to $84.26 per MWh, for contract periods varying in length from 15 to 25 years. Some responses priced their power at the busbar (that is, at the turbine sites). Others included the price of transmitting the power to a Southern Company interface.
- That nine of the projects offered power under $30 per MWh for busbar delivery. The busbar price represents the cost of delivering the power at the generation location. It does not include transmission-related costs.
- That the transmission-related costs for bringing power to Southern Company were between $1 and $6 per MWh for all but a small fraction of hours in 2014. During those few hours, the transmission-related costs were significantly higher.
- That Georgia Power calculated the net benefits of each of the wind project proposals by comparing its total cost to customers versus the company's avoided cost. This included transmission-related costs. Of the 37 projects analyzed by Georgia Power, "30 projects had net positive benefits, with the majority of these having significant net benefits."

Figure 11 compares the cost of generating power at Plant Hammond with the low and high ends of the wind cost proposals received by Georgia Power in response to its Wind RFI. Figure 11 also includes the nine projects that had costs below $30 per MWh. To be conservative, IEEFA has added an $8 per MWh transmission-related charge to each of the alternatives because it is not clear which of the proposals included delivery to the Southern Company and which did not. As Figure 11 shows, even with this $8 per MWh charge, all but the most expensive wind project would produce power at a significantly lower cost than Plant Hammond.

8 U.S. Department of Energy, 2014 Wind Technologies Market Report Highlights, at page 4. Available at www.energy.gov/windreport.

9 LaCapra Associates, Memorandum to the Georgia PSC, *Wind Request for Information Review,* May 19, 2015.

Figure 11: The Price of Power from Plant Hammond vs. Responses to Georgia Power Company's Recent Wind Request for Information.



Energy Efficiency

Energy efficiency is almost always a utility's least expensive resource. According to a recent review of energy efficiency programs in the U.S., the cost to a utility to save one kilowatt hour of electricity averages 2.8 cents, with a range of 1.3 to 5.6 cents per kWh.[10] This is almost always less expensive than generating the same unit of power. Utilities can invest in energy efficiency in many ways, including, but not limited to, by offering rebates for more energy-efficient appliances; providing home energy audits; and by providing efficiency incentives to industrial energy users.

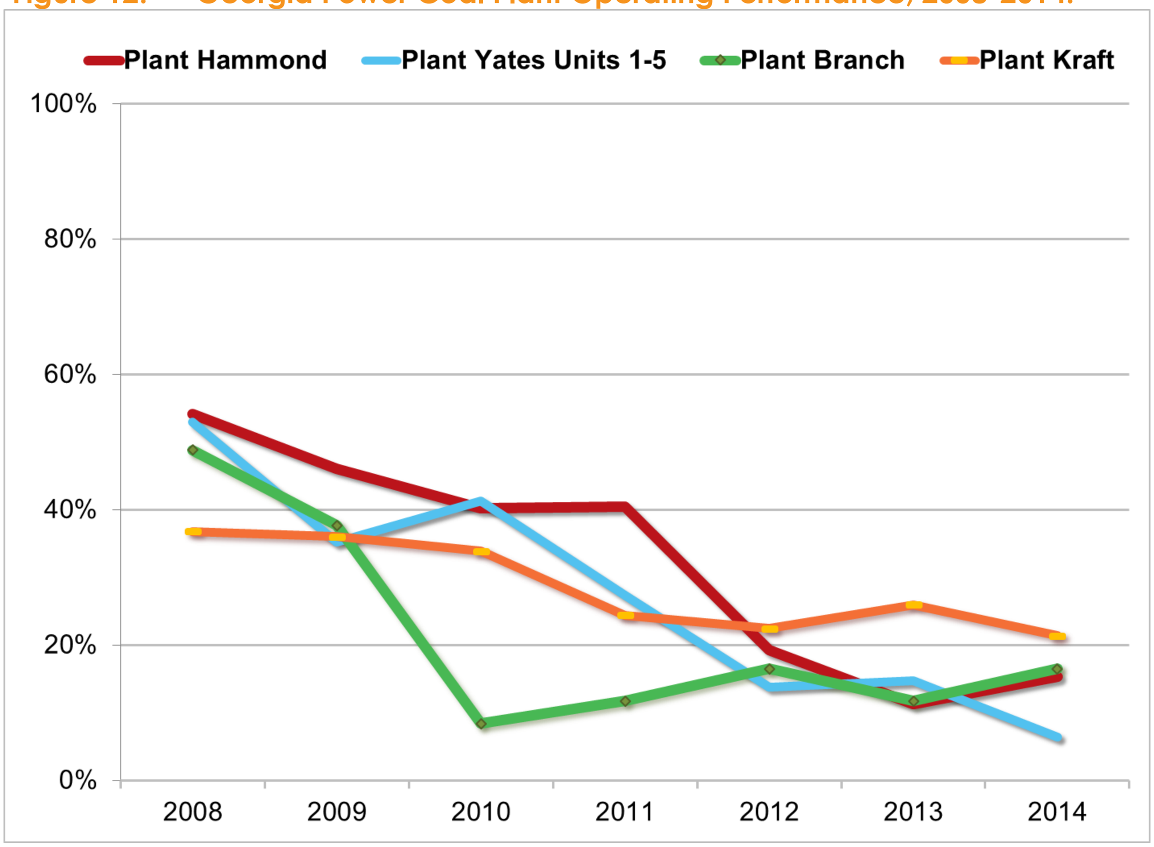
10 M. Molina, "The Best Value for America's Energy Dollar: A national review of the cost of utility energy efficiency programs," American Council for an Energy Efficient Economy, March 2014.

Plant Hammond's Recent Operating Performance is Similar to That of Other Plants Georgia Power is Retiring

The substantial decline in the amount of power generated at Plant Hammond since 2008 is very similar to the performance during the same period at Georgia Power's Plant Kraft Units 1-3, Plant Branch Units 1-4 and Plant Yates Units 1-5, as shown in Figure 12.

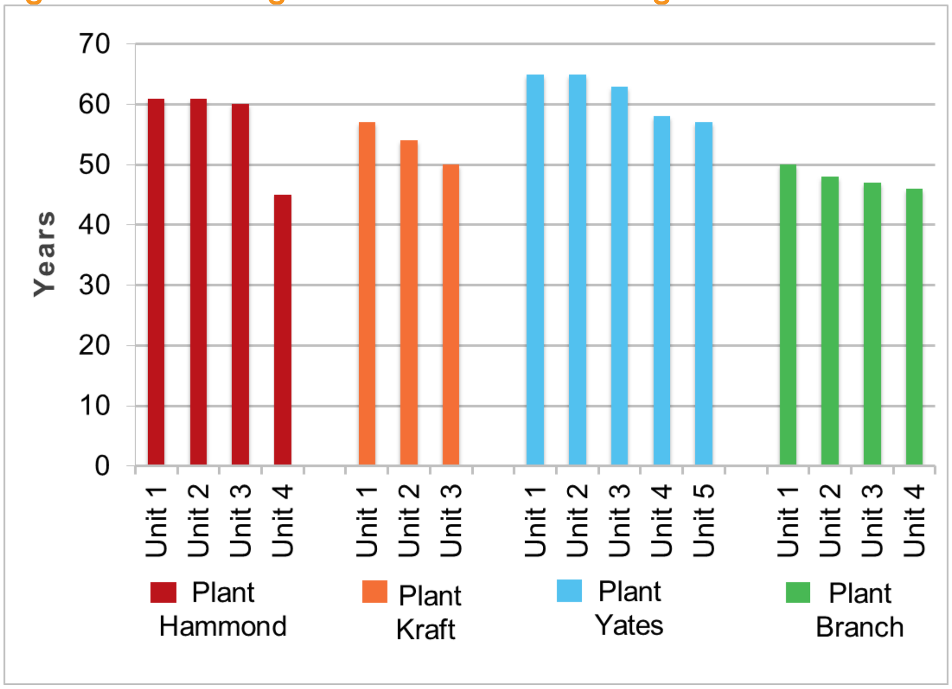
Georgia Power is retiring all of these units by April 2016.

Figure 12: Georgia Power Coal Plant Operating Performance, 2008-2014.



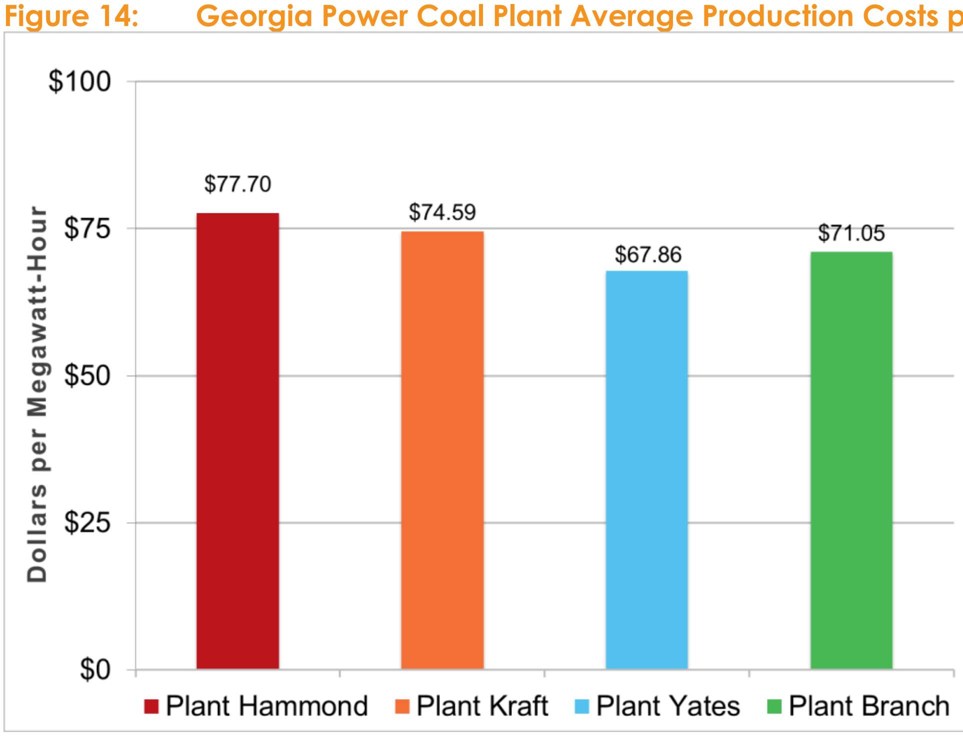
The units at Plant Hammond are of the same approximate ages as many of the units at Plant Yates, Plant Branch and Plant Kraft that Georgia Power has decided to retire. In fact, as shown in Figure 13, Plant Hammond Units 1-3 are older than many of the units that are being retired at Plant Yates, Plant Branch and Plant Kraft. And all four units at Plant Hammond employ subcritical technology, which is true also of the units at Plant Yates and Plant Kraft and two of the four units at Plant Branch that are being retired.

Figure 13: Georgia Power Coal Plant Unit Ages in 2015.



The average cost of producing power at Plant Hammond in recent years has been about the same, or higher, than the cost of generating power at the three plants that Georgia Power has decided to retire, as shown in Figure 14.

Figure 14: Georgia Power Coal Plant Average Production Costs per MWh, 2010-2014.



Conclusion

Plant Hammond has become increasingly expensive to operate in recent years and has generated significantly less power.

Its owner, Georgia Power, has lower-cost energy alternatives at its disposal: It can purchase less expensive power and it can invest in less expensive solar and wind energy and energy-efficiency programs.

Georgia Power should immediately institute plans to retire Plant Hammond.

About the Author

David Schlissel, director of resource planning analysis for IEEFA, has been a regulatory attorney and a consultant on electric utility rate and resource planning issues since 1974. He has testified as an expert witness before regulatory commissions in more than 35 states and before the U.S. Federal Energy Regulatory Commission and Nuclear Regulatory Commission. He also has testified as an expert witness in state and federal court proceedings concerning electric utilities. His clients have included state regulatory commissions in Arkansas, Kansas, Arizona, New Mexico and California. He has also consulted for publicly owned utilities, state governments and attorneys general, state consumer advocates, city governments, and national and local environmental organizations.

Schlissel has undergraduate and graduate engineering degrees from the Massachusetts Institute of Technology and Stanford University. He has a Juris Doctor degree from Stanford University School of Law.