

Sierra Club Clean Energy Analysis for Muscatine Power & Water

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Muscatine Power & Water (MPW) made public over the summer its initial plans to phase out some of its coal power, replacing part of the 270 MW plant with 30 MW of solar. MPW is currently weighing whether to replace the remaining coal burning unit 9 with a new combined heat and power (CHP) gas plant, based on a power supply study that has not been available to the public.

Sierra Club shared public comments with the MPW board this summer. Today we are sharing our analysis that finds that investing in a **clean energy portfolio (CEP) would be cheaper than building a new combined cycle gas plant** (which is typically what a CHP plant is minus the sale of excess heat).

The Sierra Club applauds MPW's preliminary recognition that it is in customers' interests to transition away from coal, as it cannot compete with cleaner, cheaper technologies. Replacing coal power with cleaner alternatives can save money and immediately improve public health outcomes through better air and water quality. However, replacing one fossil fuel burning resource with another is not in customers' interests. Our analysis shows that a CHP gas plant also does not compete with alternative technologies like wind, solar, storage, energy efficiency, and demand response.

Using a formula based on Rocky Mountain Institute's CEP algorithm, we compared the cost of two different clean energy portfolios to a potential 160 MW combined cycle gas plant. The clean energy alternatives are both cheaper than building a gas plant regardless of whether you include demand side technologies (like energy efficiency and smart meters).

Additionally, if the gas plant was built in 2028, the CEP model shows that the plant would become a stranded asset within 5-10 years. This means that within the first five to ten years of the plant's operating life, the cost of building and operating a mix of wind, solar, and battery storage would be cheaper than the costs of just running the new gas plant. All capital costs sunk into the gas plant would be stranded within a decade. In other words, this analysis shows a combined heat and power plant would leave ratepayers paying off the plant's debt long after it no longer makes sense to continue to run it. Multiple banks and investor resources have publicly expressed concerns over the stranding risk associated with building new gas plants.¹

¹ The Growing Market for Clean Energy Portfolios + Prospects for Gas Pipelines in the Era of Clean Energy. (2020, August 12). Retrieved December 17, 2020, from <https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants/>

Table 1: Technology breakdown and associated cost information of two clean energy portfolio (CEP) possibilities (megawatts) compared to the cost of a 160 MW combined cycle gas plant proposal with an estimated total cost of \$283 million

PORTFOLIO	Solar (MW)	Wind (MW)	Battery Storage (MW)	Efficiency (MW)	Demand Response (MW)	CEP cost (\$/MWh)	160 MW gas plant cost (\$/MWh)	Total Cost
CEP 1	223	129	112	0	0	\$46.92	\$54.91	\$242 mn
CEP 2	150	113	62	61	49	\$36.10	\$54.91	\$186 mn

Muscatine residential ratepayers are already facing high bill increases.

Electric bills in Muscatine have been outpacing inflation for the last ten years, adding to the energy burden of lower income households. According to EIA 861 filings, Muscatine residential customers had an average electricity bill of \$68 in 2010 and \$100 in 2019, for an average increase of 4.4% per year. Combining the rise in electric rates to cover new capital projects with higher rates for water and communications adds to the burden on MPW customers. Necessary upgrades for a new transmission line projected to go over budget add to the complexity of these decisions.

Costs for wind, solar and storage have declined dramatically in the last decade, and are expected to continue to decline through 2028. Investing in a clean energy portfolio over gas power offers a better choice to protect customers' pocketbooks.

A new gas plant does not allow for flexible operations and is thus risky for customers

While utilities often promote CHP gas units as a way of promoting higher efficiency by generating excess heat power, the problem with this approach is that it creates a competition between the needs of industrial and residential customers. If an industrial customer is in need of fairly continuous steam and/or heat, then its need may dictate the overall operational schedule of the power generator.

In times when power prices are trending lower and lower (and peaking generators need to ramp up and down often), this may create a situation where the power generator is running uneconomically. A situation when the cost to run the potential gas plant is higher than the market price for electricity may occur frequently because its steam customer is demanding regular amounts of process heat.

For this reason, building a CHP gas unit in 2028 in a high-renewables, low-power price market is not advisable. While the industrial steam customer may benefit, Muscatine's other ratepayers

would likely face high losses and/or be heavily cross-subsidizing the steam customer. It is better to separately plan the steam and electricity needs and not try to serve both needs with one technology.

We request that MPW publicly release the full power supply study, so that we can evaluate the reasonableness of the assumptions the utility is using to justify its proposal. In order to make a true comparison between our analysis and the proposed study, we will continue to push for transparency by asking for its public release. A municipal utility should not be making decisions of such magnitude without allowing the public an opportunity to evaluate the basis for that decision.

Questions for MPW

Because MPW has to date refused to make the power supply study public, or even basic information about their proposal, in order to conduct our analysis we had to make some assumptions about the size of MPW's proposed gas plant. We ask the MPW board to answer the following questions for us to further refine our analysis:

- What size gas plant is MPW considering to replace unit 9? What is MPW's current estimate of the proposed plant's cost?
- How old is the gas boiler at GPC that could be used as a backup for generating steam?
- MPW already invests in energy efficiency programs for customers. Has MPW considered investing in demand response technologies?
- Does MPW have a plan to expand electric vehicle infrastructure in the community by 2028?
- In the interest of transparency and providing a more complete analysis of the cost impacts associated with MPW's resource planning, will MPW commit to publicly releasing the full power supply study?

Sources and methodology

The Rocky Mountain Institute, The Growing Market for Clean Energy Portfolios, 2019, <https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants/>

The CEPs are conservatively designed to meet peak capacity needs in the top 50 hours of capacity need of the year in the Midcontinent Independent System Operator (MISO), the grid region where MPW and its plants operate. Some of the 50 peak hours are in the summer, when solar output is high, and some of the hours are in the winter, when solar output is low. As such, the CEP must not rely on solar alone, but rather a complement of wind, solar, storage, and demand-side management technologies. The CEP also must meet the monthly energy requirement of the potential gas plant's total generation in each month of the year. The CEP algorithm errs on the side of caution, in the sense that other grid resources (like existing gas plants or market purchases) play no role in the replacement, but those resources are typically included in system dispatch or capacity expansion models that utilities utilize in portfolio analysis. In other words, the CEP algorithm accounts for a complete energy and capacity replacement of the gas plant without the benefit of any other existing grid resources. We populated the Rocky Mountain Institute model framework with storage and renewable cost assumptions from Lazard's Levelized Cost of Energy, Version 11, and Bloomberg New Energy Finance's New Energy Outlook, both industry standard reports. In addition, the modeling includes the solar investment tax credit, excludes the wind production tax credit, and excludes an investment tax credit for storage (even though many storage projects qualify for that tax credit by pairing with solar).