July 6, 2020

Submitted via electronic mail to powersupply@mlgw.org

Re: Sierra Club Comments on Siemens's Draft IRP for MLGW

To Whom It May Concern:

The Sierra Club hereby submits its comments on the Draft Integrated Resource Plan ("IRP") prepared for MLGW by Siemens Industry Incorporated ("Siemens") as part of the Power Supply Alternatives analysis process. Our comments regarding the Draft IRP are in the attached document.

We appreciated being part of MLGW's Power Supply Advisory Team ("PSAT"), and appreciated the entire process of public involvement in the planning process.

MLGW and the City of Memphis have some significant work still to do. Making the decisions about what path to take will be difficult and will require significant thoughtfulness and introspection.

As stated in our attached document, the Sierra Club recommends that, whatever path MLGW takes going forward, MLGW must take steps to secure a clean energy future for the people of Memphis.

Thank you for your consideration.

Respectfully submitted,

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To Whom It May Concern:

The Sierra Club submits the following comments on the Draft Integrated Resource Plan ("IRP") prepared for MLGW by Siemens Industry Incorporated ("Siemens") as part of the Power Supply Alternatives analysis process. Although the Draft IRP suffers from significant flaws and distorting assumptions, it nonetheless paints a very clear picture: Memphis's future is best served by a generation portfolio consisting to the greatest extent possible of clean, renewable energy. Indeed, addressing the problems with the Draft IRP—as discussed in more detail in these comments—would demonstrate even more strongly the benefits of clean, renewable energy, and the dangers presented to Memphis's public health and pocketbook by investments in fossil fuels. Accordingly, the Sierra Club recommends that, whatever path MLGW takes forward, MLGW must take steps to secure a clean energy future for the people of Memphis.

Summary of Comments

The Draft IRP shows that the generation asset mix with the greatest amount of clean, renewable energy, and the least amount of fossil-fired power, is also the best-performing, cheapest and cleanest way for MLGW to serve its customers and the City of Memphis. A renewables-dominant portfolio with large amounts of local solar energy will save Memphis money, and will also help MLGW to address the high energy burden placed on its lower income customers and households of color.

Siemens's analysis shows these savings from renewables even despite several critical flaws that distort its Draft IRP away from clean energy and towards dirty fossil power:

- The model was prevented from selecting more than 1,000 megawatts of local solar;

- The model limited MLGW's ability to import power, favoring potentially unnecessary local investments in gas-fired generation;
- Siemens failed to adequately price carbon emissions or account for the harm from climate change;
- Siemens failed to model energy efficiency, the cheapest way to meet energy needs;
- The Draft IRP failed to properly incorporate energy storage; and
- The Draft IRP's evaluative metrics artificially overvalued fossil power while undercounting environmental and public health costs.

Correcting these analytical problems would result in an IRP that demonstrates even more strongly that MLGW should take steps to secure a clean energy future for Memphis. As a result, Sierra Club recommends the following.

- Memphis should proceed with requests for proposals for renewable energy power purchase agreements, local solar, and energy storage. Memphis should also explore the costs of transmission upgrades needed for tie-ins to MISO. Further, Memphis should explore avenues to maximize local solar and renewables generation, whether through TVA or through self-build. Finally, to minimize the risk of stranded assets, Memphis should not invest in exploring new gas generation, to minimize the risk of stranded assets.
- Siemens should conduct sensitivity analyses before finalizing the IRP that remove the cap on local solar, incorporate more accurate carbon pricing and transmission constraints, and that model energy efficiency and energy storage as premium system resources.

Following these recommendations will help MLGW best assess how to decrease costs, improve public health and public equity, and ensure that the benefits of clean, renewable energy are secured for Memphis.

Introduction

Ensuring that MLGW can deliver clean, affordable power to its customers is critical for the public health and equity of Memphis. Currently, Memphis suffers from having one of the worst energy burdens in the country, a problem that could and should be addressed by expanding access to clean energy for Memphis residents—in particular, lower income Memphis residents—with energy efficiency programs and local solar electricity generation.

The American Council for an Energy-Efficient Economy ("ACEEE") conducted a study of 48 of the nation's largest metro areas to ascertain the energy burden for communities in those

areas; Memphis topped the list for the share of gross income spent on utilities by all households as well as by low-income households, households of people of color, and renters.[1]

***Table 1: Ten Metro Areas with the Highest Energy Burdens*[2]**

Rank	All households	Low-income households	Low-income multifamily households	African American households	Latino households	Renting households
1	Memphis (6.2%)	Memphis (13.2%)	Memphis (10.9%)	Memphis (9.7%)	Memphis (8.3%)	Memphis (8.6%)
2	Birmingham (5.3%)	Birmingham (10.9%)	Birmingham (8.7%)	Pittsburgh (8.3%)	Providence (7.3%)	Birmingham (7.3%)
3	New Orleans (5.3%)	Atlanta (10.2%)	Atlanta (8.3%)	New Orleans (8.1%)	Philadelphia (7.3%)	Atlanta (6.8%)
4	Atlanta (5.0%)	New Orleans (9.8%)	Providence (7.1%)	Kansas City (7.9%)	Kansas City (6.6%)	New Orleans (6.3%)
5	Providence (4.7%)	Providence (9.5%)	Pittsburgh (7.1%)	Birmingham (7.7%)	Atlanta (6.6%)	Providence (6.2%)
6	Pittsburgh (4.5%)	Pittsburgh (9.4%)	New Orleans (6.9%)	Milwaukee (7.4%)	Birmingham (6.6%)	Kansas City (6.1%)
7	Kansas City (4.5%)	Dallas (8.8%)	Columbus (6.5%)	Saint Louis (7.4%)	Phoenix (6.0%)	Pittsburgh (6.0%)
8	Fort Worth (4.4%)	Philadelphia (8.8%)	Dallas (6.5%)	Cleveland (7.0%)	Dallas (6.0%)	Cincinnati (6.0%)
9	Cincinnati (4.3%)	Kansas City (8.5%)	Indianapolis (6.5%)	Cincinnati (6.9%)	Fort Worth (5.7%)	Saint Louis (5.9%)
10	Dallas (4.3%)	Cleveland (8.5%)	Kansas City (6.3%)	Atlanta (6.6%)	Detroit (5.7%)	Cleveland (5.5%)

This presents particularly troubling issues of energy justice and equity: while the median energy burden in the Southeast is 4.0%, it is double that for Latino households in Memphis (8.3%), and well over double for Memphis's Black households (9.7%).[3] Further, not only does Memphis perform poorly on energy burden compared with other metro areas, but the problems are varied within Memphis itself: "low-income households in Memphis experienced an energy burden over two times the median energy burden (13.2% and 6.2%, respectively)."[4]

High energy burdens impair local economic growth, and have a negative impact on public health. As ACEEE notes,

[1] Ariel Drehobl and Lauren Ross, *American Council for an Energy-Efficient Economy (ACEEE)*, "The US Low-Income Energy Affordability Landscape: Alleviating High Energy Burden with Energy Efficiency in Low-Income Communities," (2016) *available at* https://www.aceee.org/files/proceedings/2016/data/papers/11_326.pdf.
[2] *Id.* at 11-6.
[3] *Id.* at 11-5, 11-6.
[4] *Id.* at 11-5.

> Households that experience high energy burdens—above the metro area median—experience many negative impacts on health and economic well-being. Researchers have found that living in under-heated or under-cooled homes can lead to increased cases of asthma, respiratory problems, heart disease, arthritis, and rheumatism. High energy burdens can also perpetuate the cycle of poverty by requiring families to devote a disproportionate amount of income to utilities. . . . This carries real implications for the ability of these households to afford basic necessities such as food, medicine, and childcare.[5]

MLGW—particularly as a provider of not just electricity, but also gas and water—has both a heightened burden and an important opportunity to address this situation.

Local solar generation and energy efficiency investments are important ways MLGW can reduce the high energy burdens in Memphis. For example, "[w]eatherization and energy efficiency programs address issues of high energy bills by improving household efficiency through direct improvements and behavioral and education programs," while "programs that go beyond weatherization are underutilized strategies for addressing high energy burdens."[6] Energy efficiency efforts also have a marked impact on public health, as "weatherization can decrease particulates, pollutants, mold, and other allergens, leading to less asthma and allergy symptoms."[7] In particular, energy efficiency programs can result in "fewer asthma symptoms and respiratory related ED visits," and better self-reported "physical and mental health."[8] These improvements in health are significant:

> The National Evaluation by Oak Ridge National Laboratory found that 33% of individuals reported improved health of household members after their home was weatherized. Three US studies of low-income homes where energy efficiency work was conducted showed 12% fewer asthma related emergency department visits. Mental health of residents also improved due to weatherization assistance; the DOE Weatherization Assistance Program National Evaluation observed a 48% reduction in the days during the previous month that residents reported poor mental health.[9]

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[5] *Id.* at 11-1, 11-2 (internal citations omitted).
[6] *Id.* at 11-6.
[7] National Association for State Community Services Programs, Healthy Homes Month 2019, *available at* https://nascsp.org/healthy-homes-month-2019/ ("NASCSP").
[8] E4The Future, Occupant Health Benefits of Residential Energy Efficiency (November 2016), at 7 (observing a 23% decline in poorly controlled asthma for children in homes receiving energy efficiency), *available at* https://nascsp.org/wp-content/uploads/2017/09/Occupant-Health-Benefits-Residential-EE.pdf.
[9] NASCSP.

Similarly, local solar generation can play a critical role in decreasing costs for low income customers. A study performed in Colorado examined the use of low-income community solar demonstration projects alongside incorporating solar installations into home weatherization projects, and found that "low-income community solar projects can offer meaningful electricity bill savings for subscribers."[10]

While Siemens does not adequately (or even significantly) assess the value of energy efficiency in meeting the needs of MLGW's customers, the Draft IRP characterizes maximizing local solar generation builds as a "no regrets" decision, Draft IRP at 26, and the overwhelming takeaway from the modeling is that portfolios heavy in renewables and light on fossil-fired energy perform the best. Indeed, the least cost portfolio generated by Siemens's modeling, Portfolio 5, includes the greatest amount of renewable energy, and the least amount of fossil-fired generation. This is the case despite, as discussed below, the many input flaws and improper assumptions going into the modeling favoring fossil energy. The implications are clear: Memphis has an important opportunity to secure a clean energy future by pursuing sources of renewable, carbon-free power, addressing critical problems of equity and energy burden in the process.

Substantive Comments

A core conclusion flowing from the analysis in the Draft IRP is that Memphis is best served by getting its electricity from clean, renewable energy sources. The modeling that Siemens conducted for the Draft IRP generated Portfolio 5 as the least cost, best performing portfolio across the range of scoring metrics Siemens employed. Portfolio 5 has the lowest net present value revenue requirement of any of the portfolios (*see* Draft IRP Exhibits 175 and 176), saving tens to hundreds of millions of dollars over the other portfolios generated. Portfolio 5 also has the lowest overall carbon emissions of any portfolio (*see* Draft IRP Exhibits 175 and 179), emitting hundreds of thousands if not *millions* of tons less carbon dioxide than other portfolios. Unsurprisingly, this is because Portfolio 5 has the lowest amount of dirty fossil power of any of the portfolios Siemens generated and analyzed—less than a quarter of total energy in Portfolio 5 comes from carbon-emitting sources, compared with half or more in other portfolios. Draft IRP Exhibit 175.

In other words, the cleanest portfolio was also the cheapest. Even with a series of flawed inputs, assumptions, and evaluations (discussed below) that distorted the Draft IRP analysis *away* from clean energy, *Siemens's modeling showed that the more renewables and less dirty*

[10] National Renewable Energy Lab (NREL), Reducing Energy Burden with Solar: Colorado's Strategy and Roadmap for States, *available at* https://www.nrel.gov/solar/reducing-energy-burden-with-solar.html.

fossil power a portfolio included, the less expensive it was for MLGW. Unfortunately, Siemens appears to not have had the courage of its convictions, and rather than test more thoroughly whether removing constraints on local solar from the model, or testing whether renewables or transmission upgrades or better use of energy efficiency or storage might obviate any fossil generation builds from the model entirely, it designed a new recommended portfolio, Portfolio 9, that incorporated additional gas-fired generation in 2025 as compared to Portfolio 5.

Siemens's recommendation is ill-founded. Maximizing local solar builds and pursuing opportunities to obviate new fossil generation needs through effective energy efficiency programs will help address Memphis's high energy burdens, and will also help to improve environmental equity and justice problems flowing from pollution from fossil power hitting disadvantaged communities the hardest; such clean energy is also the cheapest source of power.

However, investing in dirty fossil fuels as compared with cheap, renewable clean energy is likely to be not only a poor choice from an environmental and public health standard, but also one that will prove costly for MLGW customers. Building new gas-fired generation units presents Memphis with a very real risk of being saddled with stranded assets. The Rocky Mountain Institute concluded in recent studies that "[b]y 2035, it will be more expensive to continue operating approximately 90% of the country's planned new gas generation capacity than to build equivalent clean energy portfolios," due to the continuing decline in the cost of clean energy.[11] Likewise, BloombergNEF has found that "by the late 2020s, it will be cheaper to build wind and solar plants than to continue operating standard combined-cycle gas turbines."[12] This is consistent with what Siemens itself assumes. *See* Draft IRP Exhibits 58 and 60 (showing continuing significant declines in wind and solar prices throughout the planning period).

Accordingly, front-loading construction of new dirty fossil generation, as Siemens recommends, is inadvisable. Memphis should not bolt hundreds of millions or billions of dollars' worth of capital to the ground in the form of new fossil power in the dubious hope that such plants will not be obsolete in just a few years' time. The perceived need for such fossil generation in Siemens's analysis has more to do with the flaws in the Draft IRP discussed below than with any supposed value from gas-fired generation units. Instead, Memphis should look for opportunities to maximize the amount of clean, renewable energy available to its customers, and to Memphis.

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[11] Stephanie Tsao, Richard Martin, *S&P Global Market Intelligence*, "Overpowered: Why a US gas-building spree continues despite electricity glut," (Dec. 2, 2019), *available at* https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/54188928.

[12] *Id.*

A. Siemens Artificially Favored Fossil Generation by Preventing the Model from Selecting more than 1000 MW of Self-Build Solar

As noted above, local solar development is an excellent way to address the disproportionate energy burden borne by disadvantaged members of the Memphis community. But it is also a cheap potential source of electricity for Memphis. As the results of the Draft IRP analysis make clear, the lowest-cost resource option for Memphis is local solar generation—so much so, that the AURORA modeling in the Draft IRP selected the maximum amount available in every case. Nonetheless, Siemens elected to cap at 1000 MW the amount of local self-build solar available in its modeling, distorting the analysis and presenting at best a partial picture to MLGW that under-assesses the optimal amount of local solar resource development. Had Siemens not employed that 1000 MW cap, the model would certainly have selected much more solar, and accordingly less MISO footprint generation and/or local gas generation of the sort that Siemens added into its preferred portfolio.

In the Draft IRP, Siemens capped the model's ability to select solar at 1000 MW, despite having identified available land sufficient to host nearly four times as much solar capacity: 3800 MW. *See* Draft IRP at 84. Siemens justified this nearly 74% reduction on the theory that land acquisition and potential flooding issues would preclude the vast majority of the available land from actually being useful for solar, and by only looking within Shelby County. This is an extraordinarily conservative assessment. Not only does it assume that there is no availability for solar that MLGW could procure in neighboring Fayette or Tipton counties right next to many of MLGW's customers, it also assumes that no solar could be installed right across the river from Memphis in Arkansas.

Figure 1: Western Tennessee County Map

As such, the Draft IRP fails to take into consideration numerous additional potentialities for local solar, including brownfield redevelopment, partnership with agricultural landowners, and industrial or commercial or residential rooftop solar. Indeed, the inclusion of the 1000 MW cap flies in the face of Siemens's own recommendation:

> ***Maximize the amount of local renewable generation***, which provides local support and is not affected by transmission. This is a no regret decision, i.e. it is present in all best performing Portfolios and should be pursued. The 1000 MW limit was used in the study set to increase the likelihood of success, but ***if more local generation can be procured, this will only result in a reduced need to acquire MISO footprint generation***.

Draft IRP at 26 (emphasis added).

Accordingly, two things should happen: one, Siemens should run sensitivity analyses in which the 1000 MW local solar cap is removed, to assess how much local solar beyond the 1000 MW selected in every scenario would additionally be selected, and to see how much transmission cost and potential fossil builds are obviated as a result. It is unlikely that integration or intermittency will be an issue with such increased levels of modeled solar, whether MLGW is connected to TVA or the MISO system, as both control areas contain plenty of ramping

capability. Two, MLGW should be sure to not limit RFPs for local solar to just the areas that Siemens assumed for its modeling—it is entirely likely that there are additional market solutions for solar in and around Shelby County that would provide benefits to Memphis.

Indeed, the Siemens analysis fails to capture benefits from local renewables in the form of local economic development, and enhancement of tax bases. Construction of solar farms in rural areas, on undeveloped land, or in brownfield sites can add significantly to the local tax base, providing injections of resources for use in schools, local infrastructure, and local health care and emergency services. All of that is likely to contribute to economic development in underserved communities—something that should be of paramount importance to Memphis.

Studies examining the impact of local renewable energy generation in rural areas indicate the value of such a metric. As researchers at the Oklahoma State University Department of Agricultural Economics found, "wind energy systems can provide a significant increase to the tax base of a county, particularly rural counties . . . . each wind turbine provides the ad valorem tax base of hundreds of acres of unimproved land."[13] That additional tax revenue is of critical importance in rural areas:

> This source of funding could provide significant benefits to school districts, particularly in a number of rural districts facing declining asset values or decreased revenues from mineral severance taxes. . . Further, given the nature of the long-term power purchase contracts under which wind generated electricity is sold and the relatively long life of wind energy assets, wind energy facilities can provide relatively stable sources of school revenue for significant periods of time.[14]

These sorts of benefits from local development of renewables should be viewed in contrast to the very real risk of new fossil-fired generation ending up being costly stranded assets that increased renewables would displace.

B. The Draft IRP's Restrictions on MLGW Import Capacity Skew Its Analysis

A crucial determinant of the local reliability requirement for MLGW is its ability to call on remote resources for energy, capacity, and ancillary services to meet its customers' needs, whether from TVA or from the MISO market. Were MLGW to leave TVA and to join the MISO

[13] Shannon L. Ferrell et. al, "Wind Energy Industry Impacts in Oklahoma," State Chamber of Oklahoma Research Foundation, November 2015, *available at* https://www.okstatechamber.com/sites/www.okstatechamber.com/files/RevisedReport_WindStudy9_3_15.pdf, at 15.
[14] *Id.* at 20.

system, access to MISO resources would be limited by the transfer limit between the broader MISO region (or MISO Zone 8) and the MLGW service area.[15]

As part of its analysis, Siemens designed a hypothetical transmission interconnection with MISO as outlined in Section 8.2 of the IRP (Volume II). These are described as "preliminary routings" and it is unlikely that the proposed solutions are optimal; however, there is no reason to doubt that they and the associated preliminary cost estimates are reasonable in the absence of a more detailed generation plan, full coordination with MISO, and an RFP for transmission solutions. Analyzing its own proposed solutions, and assuming no upgrades within the MLGW system, Siemens found that the import capacity to the MLGW system would be 2,568 MW—or 2,579 MW using MISO's analytical approach.[16] Incremental upgrades could increase the import capability up to almost 3,500 MW, as shown in IRP Exhibit 83. Yet, Siemens "conservatively" assumes an import capability of 2,200 MW for the bulk of its analysis.

This assumption is extremely conservative, and it introduces a serious bias into Siemens's analysis. It is far more likely that upon further analysis, an optimal solution would be found that allows a *greater* import capability with modest upgrade costs (and perhaps additional investment in storage). Nor did Siemens analyze the cost of limiting the import capability in this way, or the benefits of the possible transmission investments shown in Exhibit 83. Stakeholders and the MLGW Board need to know what the potential benefits are of the possible transmissions investments they would make to support their energy supply options, but Siemens's analysis has only given a very limited, and overly conservative, view of this crucial issue.

A less conservative assessment of import capability would likely result in a decreased modeled reliance on self-build fossil resources in the resulting optimized portfolios. This is particularly important in face of Siemens's election to rely on its "expertise" to front-load gas-fired generation builds in Portfolio 9 versus Portfolio 5—incremental transmission upgrades would likely obviate the need for self-build gas that Siemens proposes, thereby removing the risk to MLGW and its customers of stranded assets in the form of costly new fossil plants that are quickly rendered obsolete and unneeded.

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[15] TVA has apparently indicated that it would not allow any use of its transmission system to MLGW should it leave TVA. This would be self-defeating, inefficient, and may turn out to be physically impossible or at least extremely onerous. Accordingly, should Memphis ultimately decide that leaving the TVA system is in the best interest of MLGW customers, it should seek to negotiate with TVA as part of that process for use of the TVA transmission system. In the Draft IRP, Siemens notes the likely benefits to both parties of transmission coordination: "Siemens views the 'Deal' scenario as mutually beneficial to both parties (under the circumstance where MLGW exits the TVA relationship) and the connection would provide valuable and undeniable reliability and resiliency benefits for the entire eastern interconnection of the U.S. power grid." Draft IRP at 114.

[16] Draft IRP, Section 8.5.

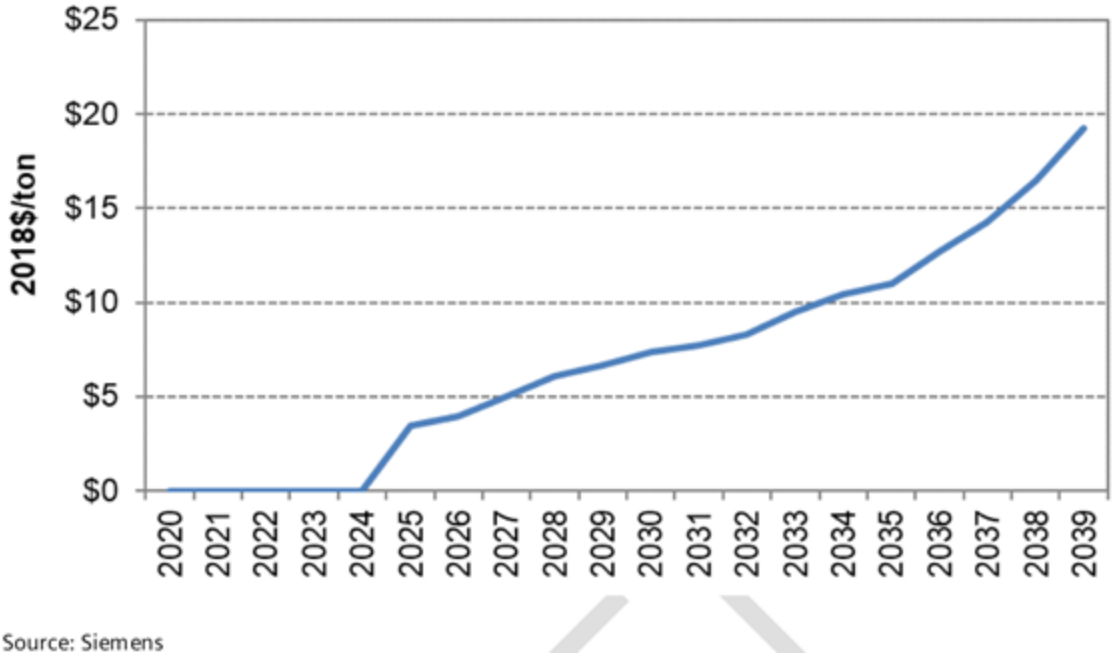
C. Siemens Analyzed Unrealistically Low Carbon Pricing, Thereby Masking Risks from Fossil Generation

Although Siemens initially considered a "climate crisis" scenario for its IRP modeling, it ultimately dropped it on the theory that its Low Load/High Gas scenario was similar enough, as, in Siemens's words, "there are strong incentives [in that scenario] to accelerate renewables and minimize thermal generation." Draft IRP at 3. This approach does a disservice to MLGW, its customers, and the people of Memphis generally. The fact is that we are *in* a climate crisis, and *all* resource portfolios generated by IRP modeling should reflect that reality—modeling that produces portfolios such as Portfolio 6, which recommends fossil-intensive generation in the form of two additional combined-cycle gas turbines and a combustion turbine, is enormously suspect, and represents irresponsible advice to Memphis. *See* Draft IRP at 299.

Some of the problems inherent in failing to incorporate the ongoing climate crisis into Siemens's approach could have been mitigated by employing an adequate carbon price or range of prices into the analysis; unfortunately, the carbon price analysis Siemens performed severely undercounts the harm from carbon emissions and the cost risk associated with fossil generation in future regulation. This amounts to an artificial favoring of fossil generation in the IRP results.

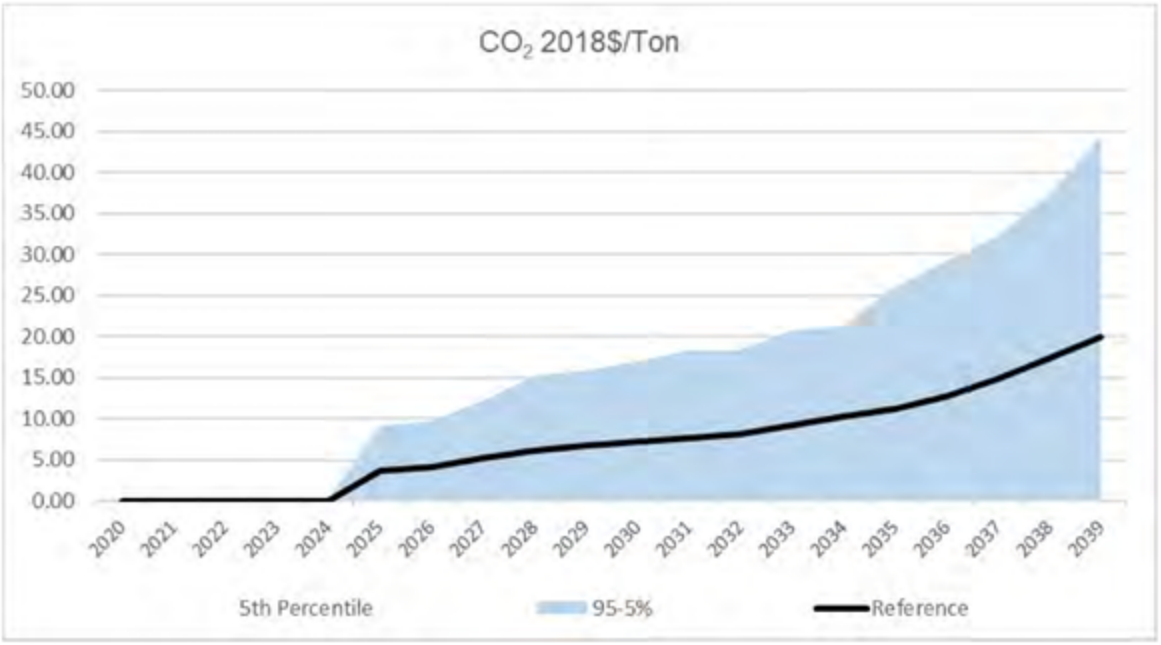
It is true that Siemens applied what it termed "a moderate price on CO_2 emissions from fossil generators . . . in the Reference Case." Draft IRP at 67. Exhibit 46 from the Draft IRP demonstrates that this price is extremely low, ranging from $0 to a high at the end of the planning period of less than $20 per ton of CO_2. Siemens's use of a stochastic range around this main carbon price figure (*see* Exhibit 97 from the Draft IRP) does little to fix the problem: the very upper end of the stochastic range at the very end of the planning period is still less than $45 per ton of CO_2, and a lower bound of $0 is maintained throughout.

Exhibit 46: Carbon Price Projections (2018$/ton$CO_2$)



Source: Siemens

Exhibit 97: CO_2 Price Distribution (2018$/ton)



Source: Siemens

Siemens generated this range of prices based on its "expert judgment" (Draft IRP at 144), and characterizes the maximum price it considered to be"the social cost of a carbon emissions program." *Id.* It is unclear what Siemens means by this, but its maximum carbon cost figure is extremely low when compared with the more commonly understood "social cost of carbon" as described in the classic U.S. EPA Social Cost of Carbon Technical Support Document ("TSD").[17] As demonstrated in Table 2 below, the Social Cost of Carbon TSD assesses a $60/ton price in 2040 *in 2007 dollars* (assuming a 3% discount rate), or roughly *$73/ton* in 2018 dollars, two-thirds higher than Siemen's maximum of <$45.[18]

Table 2: Social Cost of CO_2, 2015-2050 (in 2007 dollars per metric ton CO_2)

Discount Rate and Statistic				
Year	**5% Average**	**3% Average**	**2.5% Average**	**High Impact (95th pct at 3%)**
2015	$11	**$36**	$56	$105
2020	$12	**$42**	$62	$123
2025	$14	**$46**	$68	$138
2030	$16	**$50**	$73	$152
2035	$18	**$55**	$78	$168
2040	$21	**$60**	$84	$183
2045	$23	**$64**	$89	$197
2050	$26	**$69**	$95	$212

[17] *Available at* https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon-technical-documentation_.html.
[18] Dollar nominalization calculated through use of U.S. Bureau of Labor Statistics CPI Inflation Calculator, *available at* https://www.bls.gov/data/inflation_calculator.htm.

Likewise, in 2030, the maximum carbon price considered by Siemens in its stochastic analysis is roughly $17/ton, compared with $50/ton in 2007 dollars in the Social Cost of Carbon TSD, which, again, when translated into 2018 dollars, is even higher: $61.[19] Accordingly, even the very upper end of Siemens's carbon price analysis is but a fraction of the true social cost of carbon.

Critically, the Social Cost of Carbon TSD predates recent assessments by the Intergovernmental Panel on Climate Change ("IPCC") showing the extraordinary societal cost of failing to control greenhouse gas emissions, and so should be considered a *lower* bound on responsible carbon pricing. In its 2018 report, the IPCC calculates that a proper carbon price by 2030 should be *no lower* than $135/ton, and assesses a range that extends far above that figure.[20]

The consequences of Siemens incorporating only very low carbon prices, and considering a range that at most is a small fraction of accepted social cost of carbon figures, is to effectively favor fossil generation in its IRP analysis. Clean, renewable resources like wind, solar, and energy efficiency obviously do not emit greenhouse gases, but gas-fired generation does.[21] Carbon pricing accordingly plays a very significant role in determining which resources are selected in a cost-optimization model, as low carbon prices are in effect a subsidy to polluting energy sources, causing an optimization model to select such polluting sources more readily than otherwise. Given that even Portfolios 5 and 9, which Siemens calculates would emit roughly 1.9 gigatons of carbon over the 20-year planning period (*see* Draft IRP at 223) despite receiving approximately three-quarters of their energy from zero-carbon sources by the end of that planning period (*see id.*), the difference between low carbon pricing and more realistic carbon pricing could be hundreds of millions of dollars in costs. Using accurate carbon pricing in the Siemens analysis would therefore likely result in preferred portfolios with even less—or perhaps no—fossil generation.

D. The Draft IRP Should Have Modeled Energy Efficiency as a Selectable Resource

Memphis has enormous potential to address its energy needs through energy efficiency, and yet the Draft IRP fails to incorporate that potential into its analysis. Because energy efficiency typically displaces the most expensive generation in a dispatch curve, not only is it true that the cheapest kilowatt-hour is the one Memphis *doesn't* generate, but also that energy

[19] Dollar nominalization calculated through use of U.S. Bureau of Labor Statistics CPI Inflation Calculator, *available at* https://www.bls.gov/data/inflation_calculator.htm.
[20] *See* IPCC Special Report, Global Warming of 1.5 ºC, Chapter 2, at 153, *available at* https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_High_Res.pdf.
[21] *See* U.S. Energy Information Agency, "How much carbon dioxide is produced per kilowatthour of U.S. electricity generation?," (showing carbon emissions of roughly a pound of CO2 for gas-fired generation, and more than double that for coal-fired generation) *available at* https://www.eia.gov/tools/faqs/faq.php?id=74&t=11.

efficiency can lower costs system-wide. Other IRP analyses conducted by other utilities—including TVA itself—have incorporated energy efficiency as a resource in head-to-head competition with generation resources; had Siemens done so here, the AURORA model may well have selected zero-emitting energy efficiency in place of the gas-fired generation in Portfolios 5 and 9.

A historical shortcoming in TVA's service territory has been the failure for the TVA-LPC model to develop energy efficiency resources—there is a paucity of creative, aggressive, and effective energy efficiency programs across the Tennessee valley. As a result, Tennessee received a paltry one point out of a possible 20 for "Utility and Public Benefits Programs and Policies" on the 2019 ACEEE State Energy Efficiency Scorecard.[22] Memphis can do better. MLGW ratepayers can save money on their electric bills while avoiding costly distribution infrastructure and even capacity needs through programs to help them reduce electricity use. Most states and utilities find that energy efficiency is the lowest-cost energy resource available, especially if the same utility, like MLGW, can provide services that reduce electricity and gas use while improving the comfort, safety, and efficiency of local residences and businesses.

The Draft IRP states that it "is designed to suggest what portfolio of generating assets (power plants or Power Purchase Agreements), **energy efficiency programs**, and transmission adjustments best meets MLGW's future needs." Draft IRP, Volume 1 at 34 (emphasis added). This is misleading, because Siemens did not include energy efficiency as a resource option in its capacity expansion model. Instead, Siemens appears to have included a modest amount of energy efficiency in its load forecast, assuming that:

> Memphis will start funding EE projects by 2021 and that the useful life of the technology used in the programs will be 10 years. Therefore, the forecasted load reductions begin in 2021 and accumulate over time but flatten out after 2031. After 2031, programs will continue to replace the older technology stock, but EE as a resource will no longer result in additional net load reductions,

Draft IRP at 54. These assumptions are flawed (many energy efficiency resources have a longer life than 10 years, and the experience of utilities across the U.S. shows that efficiency gains do not plateau as Siemens predicts), and result in a significant undercounting of the availability of demand reductions through efficiency programs. Siemens projected annual reductions reaching 0.5% of energy and peak load by 2023, but leveling off at 5% of load and energy by 2032 with no additional savings. This is modest in the extreme: according to the ACEEE Scorecard, *average* annual incremental savings from energy efficiency programs in 2018 was 0.73% of sales.[23] Numerous states have annual incremental savings targets in excess of 1% of sales, and

[22] *See* https://www.aceee.org/sites/default/files/publications/researchreports/u1908.pdf.
[23] ACEEE 2019 Scorecard at 23.

several leading states have annual incremental goals in excess of 2%. There is no reason that MLGW could not provide its customers with the benefit of a more robust, effective energy efficiency program, yet Siemens did not consider expanding this very low-cost, low-risk, and jobs-generating resource as an option. *Id.* at Appendix D.

It is very likely that, had Siemens included energy efficiency as a selectable resource in its modeling, the Draft IRP would show additional savings, further reductions in air pollution, and decreased reliance on new gas-fired generation. Although TVA has thus far done an inadequate job of developing effective programs for implementing energy efficiency within Memphis (or the broader TVA service territory), it has taken steps to model energy efficiency in its own IRP analyses. For example, in both the 2015 and 2019 TVA IRPs, TVA incorporated blocks of energy efficiency resources (along with other demand-side resources) into its optimization modeling.[24] Even though in those IRPs TVA overpriced energy efficiency and arbitrarily capped how much the dispatch model could select (as Sierra Club and others pointed out in comments at the time), the models employed by TVA repeatedly selected energy efficiency as a least-cost resource up to the throttle level TVA imposed in the analyses. There is no reason why incorporating energy efficiency into the model here would not similarly show that it is a critical component of meeting Memphis's energy needs, displacing more expensive and dirty fossil power.

E. Siemens's Draft IRP Fails to Properly Analyze Energy Storage

Siemens's treatment of storage resources, specifically battery storage (but also other storage technologies), fails to capture the full potential value of such resources. Because batteries do not themselves supply energy, they cannot be directly compared with generation resources. In some sense they are more like transmission than generation, as their primary function is to make more efficient use of other generating resources such as intermittent renewables. They can also help to avoid costly transmission and distribution upgrades by augmenting the power available at peak times. These high-value services are not well represented in generation expansion models such as AURORA LTCE and, like transmission solutions, often have to be imposed on the model to determine what effect they would have on the future cost of meeting load. This is, however, not the same as the approach taken by Siemens for Scenario 6, wherein it disallowed CTs in the model to force it to "choose" battery storage (sec 1.2.6.). Battery storage is not generation, even

[24] *See* TVA 2019 IRP at 5-1 ("In the 2015 IRP . . . energy efficiency and demand response were modeled as selectable resources. In the 2019 IRP, TVA has made further refinements in modeling behind-the-meter generation in the load forecast, including variations across the scenarios" examined); *id.* at 5-13 ("The 2019 IRP builds on the innovative modeling approach used in the 2015 IRP to evaluate EE as a supply-side resource, with characteristics and costs structured similarly to conventional generating resources or power plants"), *available at* https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4.

peaking generation, and the high-value attributes of battery storage are unlikely to be recognized through this modeling approach.

Another way to model battery storage is to "pair" it with a resource such as solar such that the output of the combined system can be smoothed or delayed to address the late afternoon convergence of increasing load and decreasing solar output (sometimes referred to as the "Duck Curve" problem.) This approach could well negate the apparent need for additional gas resources in Portfolios 5 and 9 while still maintaining their low cost, relative to other portfolios.

Siemens notes that battery systems were not selected in any or its AURORA LTCE runs except Portfolio 5 which, interestingly, was also the lowest-cost portfolio. At the same time, the maximum amount of local solar allowed was chosen in *every* portfolio. These observations suggest that the combination of solar and battery storage is a valuable and economical resource for meeting Memphis's energy needs with clean energy resources. However, Siemens did not further pursue this option.

Finally, as noted in the Draft IRP (*see* section 5.2.5) battery costs and performance have been improving rapidly and are widely expected to continue to do so. For this reason, and because of the special system services provided by batteries, a well-designed RFP for battery-based reliability solutions could be extremely fruitful. This should be an ongoing process, both in the current planning period and whenever MLGW seeks additional generation or reliability resources.

F. Numerous Issues with Siemens's Approach to Scoring and Distinguishing Portfolios Obscure the Benefits of Renewables and the Harms from Fossil-Fired Generation

In addition to the problematic modeling inputs and assumptions detailed above, several issues with Siemens's approach to analyzing the modeling results tend to skew the Draft IRP conclusions more in favor of fossil-fired power than is otherwise appropriate.

First, while the Draft IRP correctly includes carbon dioxide emissions as a metric for evaluating portfolios, other important resource use parameters are not similarly highlighted. Of particular importance to Memphis is water consumption. Local self-build solar does not require water cooling. But, as Siemens notes, local gas-fired generation sited in Memphis would need cooling, requiring water. Draft IRP at 69. Siemens "estimates that water needs" for *each gas-fired unit* "could reach 100,000 gallons per hour," or millions of gallons per day. *Id.* Siemens further assumes that this water would be supplied by the Memphis municipal system. *Id.* at 70. All of the portfolios generated by the AURORA modeling include gas-fired units, because Siemens did not assess any non-fossil portfolios; as a result, Siemens elides the important

distinction between clean energy portfolios and those that also include fossil generation in terms of the water impact on Memphis and the water supply MLGW is already tasked with providing.

Second, while Siemens does look at cost implications for nitrogen oxides ("NOx") under the federal Cross-State Air Pollution Rule ("CSAPR") trading scheme (*see* Draft IRP at 68-69, concluding that such costs are "expected to remain low"), the Draft IRP fails to consider the public health implications of air pollution from the new gas-fired generation Siemens recommends.

Additional NOx pollution in Memphis is particularly critical. New gas-fired generation in or near Memphis would lead to increased emissions of NOx. NOx is what is known as an "ozone-precursor" pollutant, as ambient NOx pollution reacts with other pollutants to form ground-level ozone, or smog. Ground-level ozone is a serious public health concern, as it is a corrosive air pollutant that inflames the lungs, constricts breathing, and likely kills people.[25] It causes and exacerbates asthma attacks, emergency room visits, hospitalizations, and other serious health harms.[26] Ozone-induced health problems can force people to change their ordinary activities, requiring children to stay indoors and forcing people to take medication and miss work or school.[27]

Shelby County has historically had difficulties with attaining federal standards for safe levels of ambient ozone, and current ozone levels in the County are very close to the 70 part-per-billion ("ppb") 2015 ozone National Ambient Air Quality Standard ("NAAQS"). Air monitors in Shelby County have hovered at just under—or even above—that 70 ppb standard: 71 ppb in 2016, 73 ppb in 2018, and 70 ppb in 2019.[28] New sources of NOx pollution will exacerbate the situation, and could well threaten Memphis's progress in reducing harmful air pollution, while creating further environmental justice and equity problems. New fossil generation in the form of the new gas-fired combustion turbines and combined-cycle power plants present in the portfolios Siemens analyzes will not only create pollution problems for Shelby County as a whole, but will most particularly and egregiously harm the local areas in which they are placed.

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[25] *See* U.S. EPA, National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65,292, 65,308/3-09/1 (Oct. 26, 2015); U.S. EPA, Integrated Science Assessment for Ozone and Related Photochemical Oxidants 2-20 to -23 tbl.2-1 (EPA-HQ-OAR-2008-0699-0405, Feb. 2013) ("ISA").

[26] *See, e.g.*, EPA, *Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards* 3-18, 3-26 to -29, 3-32 (EPA-HQ-OAR-2008-0699-0404, Aug. 2014) ("PA"); ISA 2-16 to -18, 2-20 to -24 tbl.2-1.

[27] *See, e.g.*, PA 4-12.

[28] Data taken from U.S. EPA, Outdoor Air Quality Data Monitor Values Report, *available at* https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.

Clean energy sources such as wind, solar, and energy efficiency do not emit NOx or other air pollutants, and so do not present these same environmental or equity problems. Accordingly, the failure to address increased air pollution from gas-fired generation in the Draft IRP conceals problems flowing from fossil power while ignoring further benefits from renewables.

Third, the Draft IRP's approach towards assessing certain types of system reliability tends to draw distinctions between portfolios that are ultimately unlikely to be meaningful. All of the portfolios analyzed by Siemens meet high reliability standards, and are well-within the range required for U.S. electricity systems. Additional investments in reliability between the portfolios generated by the Draft IRP process will suffer from declining returns, and thus are not useful metrics by which to distinguish one portfolio from the other.

This is particularly the case given that system reliability in the United States has very little to do with actual outages of service. As the Department of Energy has concluded:

> Electricity outages disproportionately stem from disruptions on the distribution system (over 90 percent of electric power interruptions), both in terms of the duration and frequency of outages, which is largely due to weather-related events. Damage to the transmission system, while infrequent, can result in more widespread major power outages that affect large numbers of customers with significant economic consequences.[29]

Overwhelmingly, it is not system reliability that threatens electricity service, but "weather-related events," such as downed power lines. Adding in more gas combustion turbines does nothing to minimize these far more prevalent risks to service. In fact, quite to the contrary: further use of fossil fuels by things like the combustion turbines Siemens favors in Portfolio 9 accelerate climate changes and the destabilizing weather events that flow from it. Again, as the Department of Energy notes:

> The leading cause of power outages in the United States is extreme weather, including heat waves, blizzards, thunderstorms, and hurricanes. **Events with severe consequences are becoming more frequent and intense due to climate**

[29] U.S. Department of Energy, Transforming the Nation's Electricity Sector: The Second Installment of the QER, Chapter IV, Ensuring Electricity System Reliability, Security, and Resilience (January 2017), at 4-2, *available at* https://www.energy.gov/sites/prod/files/2017/01/f34/Chapter%20IV%20Ensuring%20Electricity%20System%20Reliability%2C%20Security%2C%20and%20Resilience.pdf.

> **change, and these events have been the principal contributors to an observed increase in the frequency and duration of power outages** in the United States.[30]

Accordingly, portfolios that favor fossil generation can increase threats to electricity service by accelerating the climate change that delivers the extreme weather events that cause power outages, even while performing "better" under Siemens's reliability metrics.

This is not a trivial concern. As noted above, the renewables-heavy portfolio with the least amount of fossil-fired generation, Portfolio 5, "exhibited the lowest expected cost" and "is the most environmentally sustainable portfolio of the group. Draft IRP at 215. Nonetheless, Siemens created Portfolio 9 from Portfolio 5 through use of Siemens's "expertise" by inserting four additional combustion turbines in 2025 to "align it more with the reliability of the other Portfolios," despite Siemens acknowledging that Portfolio 5 already "meets all reliability and resource adequacy requirements." *Id.* As such, Siemens recommends a more fossil-heavy portfolio that does nothing to decrease the real risk of service outages, that increases risks of harm due to climate change, and increases risks of harm due to air pollution and water consumption (to say nothing of the economic risk that such combustion turbines will become costly stranded assets if built many years before even Siemens thinks that they may be needed), in the name of decreasing risk.

Climate change should be a key consideration in utility planning; Siemens's election to frontload gas generation in its recommended Portfolio 9 gives far from adequate treatment to the serious climate crisis that confronts us all. As MLGW evaluates the final IRP, Memphis should keep the harms flowing from dirty fossil power first and foremost in its mind.

Conclusion and Recommendations

The Draft IRP, while flawed in significant ways, nonetheless demonstrates that the best path forward for MLGW is to take steps to secure the maximum amount of clean, renewable energy possible for the City of Memphis. Indeed, this is all the more noteworthy given that Siemens incorporated uncritically transmission and other cost data directly from TVA. As such, the Sierra Club recommends that MLGW proceed with requests for proposals for renewable energy power purchase agreements, local solar, and energy storage. Memphis should also explore the costs of transmission upgrades needed for tie-ins to MISO. Further, Memphis should explore avenues to maximize local solar and renewables generation, whether through TVA or through

[30] *Id.* (emphasis added). The Department of Energy further notes that "[o]ther risk factors" arise from "the increasing interdependency of electric and natural gas systems," again underscoring how increased reliance on gas-fired generation can increase risks to grids, rather than decrease risk. *Id.*

self-build. Finally, Memphis should not invest in exploring new gas generation, to minimize the risk of stranded assets, and to avoid exacerbating public health and environmental justice harms.

At the same time, Siemens should conduct additional analyses before finalizing the IRP, including modeling runs that remove the cap on local solar, incorporate more accurate carbon pricing and transmission constraints, and that model energy efficiency and storage as premium system resources.

We are currently in a climate crisis, the causes and effects of which are borne most egregiously by our most vulnerable and historically disadvantaged communities. Any IRP that seeks to truly assist Memphis in charting its energy future must take that reality into consideration, and its recommendations must be rooted in an honest analysis of environmental equity, and of the harms that flow from dirty fossil power.

Sincerely,

Zachary Fabish
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The Sierra Club
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Washington, D.C. 20001
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SIERRA CLUB
TENNESSEE CHAPTER

Shelby County Resident Comments on MLGW Integrated Resource Plan

Submitted via Sierra Club

The following spreadsheet contains names and contact information of people who signed the letter below:

> Thank you for the opportunity to provide comments on MLGW's draft Integrated Resource Plan. I appreciate MLGW including the public in this important decision. It should not be made behind closed doors.
>
> As a Sierra Club supporter, my top priority is making sure that Memphis and the surrounding areas have access to sustainable and secure supplies of cost-effective clean energy for its people and businesses.
>
> The draft IRP's planning vision, however, still comes up short on the potential use of renewable power and energy efficiency, both of which lower electricity bills and reduce the air and water pollution caused by burning fossil fuels. The draft IRP also relies far too heavily on risky gas to meet Memphis's future energy needs.
>
> Memphis and Shelby County are ready to be a clean energy hub, not only for the Tennessee Valley, but also for the South Central U.S. No matter from whom or where we get our electricity, Memphis can attract new businesses and have good-paying jobs by committing to use more wind power, solar energy, and battery storage technologies, and put in place new efficiency programs that will help to reduce the already high energy burden that far too many Memphians face.
>
> It's time for MLGW to quickly move forward with plans for more clean energy, while minimizing any investments in dirty, expensive fossil fuels or nuclear power.
>
> Thank you for considering my comments.

The spreadsheet contains 113 signatures. 63 of the signatories (57%) wrote additional personal messages. These signatures indicate broad and diverse support for MLGW to quickly and boldly increase clean energy.

Thank you for considering the input from these community members.

First Name	Last Name	City	Postal Code	Personal Message
Emily	Graves	Memphis	38104	Renewable energy and energy efficiency are the key to long term success and long term profits. Don't be short sighted.
Cliff	Bahlinger	Cordova	38016	It is time for a change. Lower cost power is available. Solar power continues to decline in price.
Janice	Vanderhaar	Memphis	38141	I support any effort to move us toward cleaner energy in Memphis. It protects our future in this fragile world of global warming.
James	Drummond	Memphis	38104	MLGW should make a concerted effort to use renewable sources of energy. I recognize that currently procuring electricity from sources that generate power from wind or solar devices may be more expensive than fossil fuel sources. MLGW should consider providing a renewable source billing option for customers willing/able to pay extra. This option could include an additional fee to support subsidies for renewable sources for low income customers.
Michael	Sumner	Germantown	38138	Pollution i.e. caused by lack of clean energy kills people, both directly, and indirectly such as making them more susceptible to Covid 19. I assume that MLGW does not warm to harm the people of Memphis and therefore thew must invest in clean energy solutions.
Abigail	Cox	Memphis	38104	Our community deserves a healthy environment - MLGW should be supporting that goal, as the community supports MLGW.
Joaquin	Villarreal	Millington	38053	I want more renewable energy; especially solar power.

First Name	Last Name	City	Postal Code	Personal Message
Christian	Kauffman	Memphis	38120	We need for the city of Memphis to rely on clean, renewable energy for a greater percentage of our usage in order to ensure equality of all members of our community and prosperity for those in the future. Clean energy ensures that toxic gases do not cause asthma and other respiratory disorders to economically disadvantaged citizens (particularly members of the black and Hispanic communities). It also ensures that we can preserve the viability of the city, which is put at jeopardy if global warming continues.
Carolyn	Felts	Memphis	38122	I support clean air and lower utility bills especially for senior citizens
Justin	Gillis	Memphis	38104	We would be remiss to not utilize clean energy. This benefits everyone.
Brandon	Taylor	Memphis	38107	Solar just makes sense environmentally and fiscally. You are either on the side of progress, or not. Do the sensible thing. Thanks.
Barbara	Standing	Memphis	38103	Other cities have gotten on board with clean energy a long time ago. It's time for Memphis to step it up.
Connie	Arduini	Memphis	38104	We must start to transition to cleaner energy!
Tamara	Braithwaite	Memphis	38111	Any move that would allow for cleaner, energy-efficient power I am all for. It would not only help the environment but the people who are often overlooked when it comes to decisions like this. Stand up for them and the environment in your decision!

First Name	Last Name	City	Postal Code	Personal Message
Rachel	Farmer	Germantown	38138	I support 100% renewable, clean energy sources being used by MLGW. Fossil fuels are antiquated, dirty, inefficient, and killing the planet. Please have the courage and foresight to change over now. You have the power to change the future for our children.
robert	banbury	Memphis	38107	I want more clean energy so my water will stay clean and my neighbors' lungs will breath fresh air.
John	Moses	Memphis	38112	This is a once-in-a-generation opportunity. I want to be able to tell my children that I supported the energy movement in Memphis that brought clean energy, affordable energy, and racially just energy to our home. Please make the most of this opportunity and create the future we all want to live in! - thanks, Dan
Edward	Jones	Memphis	38117	We want CLEAN lowest cost possible electricity for our homes and our city. Solar generated power and electric busses and cars and trucks that run on solar power would be ideal. Our air would be cleaner
Edward	Jones	Memphis	38117	I want clean energy at a reasonable cost. NO atomic-fueled power plants, no coal fueled power plants that pollute our air, please. SOLAR power is what we want.
Karen	Casey	Memphis	38112	Our aquifer, our air, are priceless and can't be replaced.
Linda	Kaplan	Germantown	38138	We must be at liberty to develop Clean Energy before 20 years down the road and to do this we cannot sign a contract with TVA. If we do, it is probably that many of us will not be around due to the impending crises that is before the 20 year mark. Thank you.

First Name	Last Name	City	Postal Code	Personal Message
Gigi	Gonzales	Memphis	38128	ITS SAFE FOR EVERYONE AND ENVIRONMENT INCLUDING LOWERING MY BILL!!
Rachel	Levine	Germantown	38138	I care about our planet and it?s future for my daughter and my grandchildren. I believe we have to change to clean energy to protect our planet and all species that inhabit it!
Sara	Oaks	Cordova	38018	Costs have come down . We are in the middle of climate change. There is no reason for us not to use a majority of clean, renewable energy.
Sheila	Patrick	Memphis	38107	Once we lose the gift of clean air it will be almost impossible to get it back. We muse act proactively now.
Caitlin	Hassinger	Memphis	38104	Memphians are ready for a bold environmentally just and innovative future. Please think bigger or real progress will forever be stalled.
Anna	Hogan	Memphis	38112	Please make our beautiful city a clean energy city. What could be more important than having clean air to breathe and clean, safe water to drink We live in a city with a high rate of asthma sufferers. You must consider reducing pollution here in order to make this a healthier place for all our citizens.

First Name	Last Name	City	Postal Code	Personal Message
Laura	Ingram	Bartlett	38134	Clean water and air are going to be even more important in the future. We need to take responsibility for the world our descendants will inhabit.
Lawrence	Jasud	Memphis	38111	We've lost 50 years avoiding doing anything about climate change. Time has run out. We must begin to act now while we still can. Clean renewable energyis a substantial step we can take now.
Kim	Mcintyre	Arlington	38002	It has been a long time coming to clean up Memphis...FOR EVERYONE, no matter their economic status...I have always believed in the cleanliness and benefit of solar power and have been waiting for technological advances to make it a reality. Please help us move foward to a safer, cleaner energy that benefits ALL of Memphis.
Pam	Clifford	Cordova	38016	Please help Memphis and Shelby County move forward and move towards clean energy. Time to make some changes to make this happen NOW!
Hunter	Oppenheimer	Memphis	38104	I want more clean energy for the sake of our air and water quality, now and for the generations of Memphians to follow.. Let's take the money we save from TVA and update our infrastructure in our city. Keep our money here where it is needed to increase our standard of living by investing in our own city's infrastructure, rather that propping up a bloated TVA.

First Name	Last Name	City	Postal Code	Personal Message
Joe	Ozegovich	Bartlett	38135	It is imperative we move to 100% clean energy by 2050. The flexibility to not only purchase clean energy abroad, but the capability to generate and store our clean energy locally is an answer to this goal. We will see a spending increase between 5-10% of GDP from the effects of climate change. Establish local battery storage and community solar rebate programs to stabilize our grid. In addition, battery storage would act as backup generators when power loss occurs. It is clear, loss of electrical power is an issue for Memphis with our mature trees. As a solar provider to TVA, owner of an electric vehicle, changing to heat pumps, and through actions with escore & energy doctor, I have cut my energy consumption by more than 1/2 of MLGW's avg. My home produces more clean energy that it consumes. The panels were assembled right here in Memphis, and my 1st electric car made in TN. Smart people thought ahead and we can do it again. Change the paradigm.
Robert	Sutton	Bartlett	38135	More clean energy the better for everyone.
Hunter	Oppenheimer	Memphis	38104	I want clean, renewable, affordable energy, and to get away from TVA. Thank you.
Emily	Oppenheimer	Memphis	38104	Please focus on clean, efficient energy for the health and safety of all our citizens!
Glenda	Case	Memphis	38127	Me and my sister are on fixed income, and we have to be hot in Summer and cold in Winter to be able to pay these huge bills.
Nicola	Cassandras	Lakeland	38002	We need to do more to create memphis area a place for future generations.

First Name	Last Name	City	Postal Code	Personal Message
Thomas	Wynn	Memphis	38134	Please HELP our Earth! Thank-you!
Sidney	Sensing	Memphis	38112	Please consider the impact you have on the Memphis community.
Steve	Steffens	Memphis	38111	We have to move to clean energy no matter if we are aligned with TVA or MISO!
Vicki	Howell	Memphis	38120	We all deserve clean , efficient energy.
Joseph	Walker 2nd	Bartlett	38135	We are going to eventually go to clean energy sources, so the sooner the better.
Anita	Waid	Memphis	38103	I want clean affordable energy for Memphis!! Please do all you can for clean energy. Stop the dumps into the Mississippi River! So ashamed of the smell. Make Tennessee cleaner. You have the power!
Charlee	Graham	Memphis	38104	Let's bring Memphis up to date and shared of the curve! We have so much good in our city. Renewable energy is great for us all!
Michel	Ward	Bartlett	38134	As a resident of the Memphis area, I would love to see MLG&W start utilizing alternative energy because taking care of our environment is extremely important.
Mary	Gibson	Memphis	38107	We need clean energy now. I don't understand why MLGW relies on natural gas when the cost of clean energy continues to drop making it a much more cost effective solution for Memphis residents and the planet. Lead on this MLGW and be a good steward for Memphis and the planet.
Michael	Barsotti		38111	Memphis has the opportunity to lead by example, and we should.

First Name	Last Name	City	Postal Code	Personal Message
Jerry	Scruggs	Memphis	38103	Every day I smell the Valero plant pouring out pollution and watch endless trains crossing the river with coal and barges going down the river full of coal. It is time to stop this senseless destruction of our planet.
Rachel	Mccoy	Cordova	38016	Please make Memphis and the greater Shelby County an example to lead the others in clean energy. There is no better time than now to start this process.
Carolyn	Heppel	Memphis	38119	We had solar hot water for over 30 years and it was great. More people should able to experience that great power source.
Megan	Weise	Memphis	38122	Clean energy is so important. Memphis should be a leader in this area!
Nita	Jones	Memphis	38122	Please make Memphis a leader is clean energy. It will improve our environment and our quality of life.
Laura	Bledsoe	Bartlett	38134	I admire MLGW. My brother in law was a vice pres there. My dad worked there. Please invest heavily in solar energy. Have a program for people to get solar panels. You could get a grant for that. We have so much sunshine here year round. And can't you put up one small wind turbine? Just one? Maybe use to pump water. Out at Shelby Farms for the kids to look at and study. Also, there must be a way to get energy from garbage. We can do more. We can be forward thinkers and accomplish get things.
Kathleen	Tinsley	Bartlett	38135	We need clean, affordable energy asap!!

First Name	Last Name	City	Postal Code	Personal Message
Mary	Egger	Memphis	38111	I would love to see our city be progressive and lead the way toward a cleaner energy initiative.
Stephanie	Norwood	Memphis	38107	As THE utility company in our area also using clean drinking water from our aquifer you hold a lot of POWER and potential to do the right thing and keep our planet CLEAN. THANK YOU!
Corinne	Adrian	Memphis	38104	Think about the future of our planet.
Jeff	Lehr	Memphis	38111	Do the right thing, please. We are watching.
Augustus	Gottlieb	Memphis	38112	We should be doing our best to embrace progressive energy solutions rather than clinging to old ones that take a toll on the many natural resources we are blessed with.
Mary Alyce	Clay	Memphis	38134	MLGW should be an Energy Leader. We need clean, affordable energy, and this. should be included in your long -term plan. Respectfully submitted, Mary Alyce Clay
Kent	Minault	Knoxville	37917	In order for my grandchildren to expect a stable atmosphere to breathe during their lifetimes, we need to shut down fossil fuel power within the next decade. Memphis' IRP could be a real help - if it mandates enough renewable energy to pull demand away from coal and gas. All across Tennessee, we are looking to Memphis to do the right thing.
Nellie	Medlin	Memphis	38134	
Jane	Fadgen	Eads	38028	
Tresa	Reed Crutchfield	Bartlett	38135	
Daniel	Rudolph	Memphis	38119	
Margaret	Franklin	Collierville	38017	
Noel	Emswiler	Bartlett	38135	
Brittanee	Bachelor	Memphis	38117	
Nicole	Tirrell	Lakeland	38002	
Scott	Banbury	Memphis	38107	
Scott	Banbury	Memphis	38107	

First Name	Last Name	City	Postal Code	Personal Message
Sandra	Chapman	Millington	38053	
Sheila	Varnell	Bartlett	38134	
Amy	Stewart-Banbury	Memphis	38107	
Steve	Cunningham	Memphis	38112	
Corey	Strong	Memphis	38112	
Rhiannon	Smith	Memphis	38119	
Christina	Clack	Memphis	38127	
Anne	Acron	Memphis	38125	
Nigel	Bowen	Lakeland	38002	
Karl	Harris	Collierville	38017	
Linda	Purser	Memphis	38111	
Edward	Jones	Memphis	38117	
Kelsey	Mccathie	Germantown	38138	
Anna	Saffer	Germantown	38138	
Nathan	Short	Memphis	38122	
rylee	renfrow	Arlington	38002	
Daphne	Maysonet	Memphis	38107	
Teresa	Iovino	Germantown	38138	
JoAnn	McIntosh	Clarksville	37043	
Mark	Kaserman	Arlington	38002	
Lisa	Phillips	Memphis	38112	
Katie	McMurtry	Memphis	38104	
Frank	Cooper	Memphis	38111	
James	Wilson	Memphis	38111	
William	Turner	Millington	38053	
Robert	Caen	Germantown	38139	
Jason	Sparrow	Memphis	38103	
Philip	Williams	Cordova	38016	
Tia	Uphoff	Memphis	38111	
Matthew	Shepherd	Cordova	38018	
Paige	Crunk	Bartlett	38135	

First Name	Last Name	City	Postal Code	Personal Message
Nick	Landers	Memphis	38134	
Dianne	Bowen	Memphis	38122	
Jasper	Love	Memphis	38016	
Ashley	Rougeou	Memphis	38120	
Genna	Lutz	Memphis	38103	
Christine	Cespedes	Millington	38017	
Catherine	Pena	Memphis	38117	
William	Brisolara	Memphis	38111	
William	Campbell	Murfreesboro	37130	