taylor | english

**Taylor English Duma LLP** 1600 Parkwood Circle, Suite 200, Atlanta, Georgia 30339
Main: 770.434.6868 Fax: 770.434.7376 taylorenglish.com

**L. Craig Dowdy**
**Direct (404) 640-5958**
**cdowdy@taylorenglish.com**

November 18, 2022

***Via Alternative Electronic Filing***

Ms. Sallie Tanner
Executive Secretary
Georgia Public Service Commission
244 Washington Street, SW
Atlanta, GA 30334
**stanner@psc.ga.gov**

**Re: In re: Georgia Power Company's 2022 Rate Case; Docket 44280**

Dear Ms. Tanner:

For filing in the above-styled docket, please find the enclosed *Direct Testimony of Alden M. Hathaway, P.E. C.E.M.* on behalf of the Southface Energy Institute, Inc. & Southern Alliance for Clean Energy Incorporated. As required by the electronic filing procedures, a physical copy of this filing will be mailed to the Commission. Thank you for your attention to this matter.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,

L. Craig Dowdy
For TAYLOR ENGLISH DUMA LLP

Enclosures
cc: All parties of Record

**STATE OF GEORGIA**
**BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION**

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| **In Re: Georgia Power Company's 2022 Rate Case** | ) | **DOCKET NO. 44280** |
| | ) | |

**DIRECT TESTIMONY OF ALDEN M. HATHAWAY, P.E. C.E.M.**
**ON BEHALF OF SOUTHERN ALLIANCE FOR CLEAN ENERGY**
**AND SOUTHFACE ENERGY INSTITUTE, INC.**

**November 18, 2022**

**Q1: PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.**

A1: My name is Alden M. Hathaway. I am the Senior Energy Engineer and Project Manager for 2RS Consulting, LLC. Our business address is PO Box 541, Palmyra, Virginia 22963, although we operate locally out of 4025 Pinebrook Circle, Cumming, GA 30028.

**Q2: ON WHOSE BEHALF ARE YOU TESTIFYING?**

A2: I am testifying on behalf of the Southern Alliance for Clean Energy ("SACE") and Southface Energy Institute ("Southface") before the Georgia Public Service Commission ("Commission").

**Q3: MR. HATHAWAY, PLEASE SUMMARIZE YOUR EDUCATIONAL AND PROFESSIONAL EXPERIENCE.**

A3: I am licensed by the State of Georgia as a registered Professional Engineer in the Engineering Power, Energy and General Electrical Knowledge disciplines, with nearly 41 years of consulting, engineering management, sales, and project development experience in the fields of solar, wind and energy efficiency systems. My Georgia State License Number is #035053.

I am also a registered Professional Engineer in the State of South Carolina for the same Power and Energy Disciplines. My South Carolina License Number is No. 34482. Our consulting practice is focused on energy and sustainability support with engagement in the federal, state, and private sectors.

My areas of expertise include: energy efficiency, including lighting, HVAC and industrial process energy efficiency; renewable energy, including solar and wind, bioenergy and renewable natural gas; energy storage technology, including controls, thermal and electric battery; micro-grids, controls and energy dashboards; plug-in electric vehicles; electrical infrastructure; electric demand and energy bill analysis; Renewable Energy Certificates ("RECs"), Energy Efficiency Credits ("White Tags") and Carbon Offsets, development, tracking mechanisms, sales and consulting.

In my 40+ years of experience, I have worked for three years for two electric utilities, including Georgia Power and Eastern Edison in their energy services and power marketing departments. For over a decade, I worked for two manufacturers, GTE Sylvania Lighting and Solarex (a solar manufacturer, originally based in Frederick, MD). For another decade, I worked as an energy consultant in Washington, D.C. for the U.S. EPA's Energy Star and Green Power Partnership programs, marketing for and implementing the program on behalf of over 1,000 member partners as a manager of a team of up to 16 field engineers. The remaining decade and a half I served Sterling Planet, one of the nation's largest retailers of renewable electricity as its SVP for Business Development, supporting utilities and commercial companies alike in renewable energy procurement, green power programs, REC and Carbon Offset sales, and solar and energy-efficient lighting project development and application.

I have developed, hold, or been named on three U.S. Patents regarding an Energy Efficient Lighting System, a Direct-Current Based Solar and Lighting Interconnection System, and an Energy Monitoring Algorithm using Artificial Intelligence to Predict

Baselines for White Tag Measurements. I have been recognized with awards by both the U.S. EPA Market Development of the Energy Star Buildings Program (1995) and the U.S. Department of Energy Wind Advocacy Award (2005). I was named as Loudoun County, Virginia's Environmental Volunteer of the Year in 2001 for the development of a solar and energy system at the Barns of Franklin Park. I was also recognized as an Association of Energy Engineers ("AEE") "Legend in Energy" in 2011. I have been a Certified Energy Manager since 1993.

I co-founded and have maintained my role as Board Member for the 25-year-old non-profit organization, Solar Light for Africa, which has presided over the installation of over 2,800 solar lighting, power, and water systems in nine sub-Saharan African Countries, including Uganda, Tanzania, Rwanda, Kenya, Ethiopia, Sudan, Ghana, Liberia, and Sierra Leone. Most systems were off-grid Direct Current based systems, but at least 50 of those systems were grid-tied and 20 of them microgrid systems. I have also been involved with and/or directly developed solar-microgrid type (solar plus battery plus load) systems in Massachusetts, Pennsylvania, Virginia, and Georgia.

I have authored two books on Solar Energy and Net Zero Energy Homes about my family's solar home in Virginia and our second solar home in Georgia, including my latest publication, **Energy Independence – The Individual Pursuit of Energy Freedom**, published by River Publishing in 2022. Our first solar home has been featured in at least two other books and major publications: including **The Greened House Effect**, Jeff Wilson, Chelsea Green Publishing, 2013; **The Hathaway "Solar Patriot" House: A Case Study in Efficiency and Renewable Energy**, Paul Norton, National Renewable Energy

Laboratory, 2005; *Piedmont Magazine*, 2008, the front cover of (and inside story) *Mother Earth News*, 2003; the *Washington Post*, 2002; *Solar Today*, 2002; and President Bush's *National Energy Policy* Plan, May, 2001. Our first solar home was featured on the National Capital Mall for Earth Day 2001 and was visited by over 26,000 people including EPA Administrator Whitman, 14 members of Congress, three U.S. Senators, a number of White House staffers, and DOE officials.

I have written extensively on energy policy, energy design and marketing programs, including in: *Public Utilities Fortnightly*, *Consulting/Specifying Engineer*, *AEE Energy Engineering Journal*, *Energy User News*, *World Aid Directory*, *Solar Today* and *North American Clean Energy*. The topics ranged from integrated building designs including lighting, HVAC, and solar to increasing load factor on utility systems to reduce overall system cost.

I hold a Bachelor of Science Degree in Electrical Engineering from the University of Virginia. AMH-Exhibit-1 includes my full curriculum vitae.

**Q4: HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION?**

A4: No, I have not previously testified before the Georgia Public Service Commission.

**Q5: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A5: The purpose of my testimony is to comment on the current electrical efficiency of the electric grid in Georgia, and the propensity to which that efficiency could be improved through distributed generation technologies deployed at the load, including solar. In my analysis, I project a cost savings across the electrical transmission and distribution system when deploying the same distributed energy technology that rebuts Georgia Power witness testimony suggesting a cost shift from solar customers to non-solar customers. It is my opinion, based on this analysis, that an efficiency across the system benefitting the entire system of ratepayers, therefore, cannot be a cost shift to non-solar customers adversely affecting their costs, but a natural savings shared by all.

My testimony will address the structure of generating, transmission, and distribution assets in Georgia and electricity sales through all assets to all Georgia Power customers in the state. I provide a calculation to show the average system load factor, or degree to which those assets are utilized, and then a comparison to other systems where system load factor has been improved, and by what degree. I then summarize a system cost reduction on a percentage basis for each basis point improvement in load factor based on other systems, and project the potential system cost reduction in Georgia by pursuing a distributed solar generation rooftop program.

Finally, I will rebut earlier testimony by, Ahmad Faruqui, Ph.D. to this Commission in 2019 on there being a cost shift from solar generator to non-solar electrical users, with his own recently published statements, now claiming that solar, especially with battery storage, reduces transmission and distribution costs across the system. This is further supported by Southern Company's own experience in two residential solar microgrid projects in Alabama and Georgia that will also be pointed to in this testimony. With this rebuttal, and new-found information pointing with confidence in the ability of distributed generation to lower costs across the system, I will stress that the position by the

Commission on solar net metering should now be reversed to give full energy credit for all kWh generated by individual solar generators.

**Q6: ARE YOU SUBMITTING EXHIBITS ALONG WITH YOUR TESTIMONY?**

A6: Yes, I am submitting two (2) exhibits along with my testimony, as follows:

1. AMH-EXHIBIT-1: Curriculum Vitae of Alden Hathaway; and
2. AMH-EXHIBIT-2: Tax Shift of Funds to Other States from Georgia Citizens Each Year Solar NEM is Unavailable.

**Q7: MR. HATHAWAY, DO YOU HAVE ANY REASONS TO SUPPORT YOUR CLAIM THAT NET METERING IS IMPORTANT FOR COMMERCIAL AS WELL AS RESIDENTIAL CONSUMERS?**

A7: Yes. I serve on the building committee and Green Guild of St. David's Episcopal Church in Roswell, Georgia. I also lead a missions program to Africa, called Solar Light for Africa, that is supported by the church. St. David's has embarked on an ambitious campaign to reduce its energy consumption through energy efficiency and is considering solar as well, under the provision, that the more energy costs it can save, the more can be set aside for supporting missions programs. Solar would have been considered by St. David's, except that the current position on reimbursing only at the wholesale solar rate does not generate enough savings to service the cost of solar.

As a church on a demand rate, like St. David's, there is a demand penalty that sets in during Sunday services that causes the church to pay a much higher rate for electricity, even though this demand is set during a time (Sunday morning) when system demand is not peaking. The use of solar would help reduce this peak demand. However, if the sale of energy is only valued at the current solar buyback rate, it will not even pay for itself let alone help the church limit demand on the Georgia Power Company system and free up funds for our mission to Africa.

This church-electric demand problem was recently highlighted in an article in Utility Dive,[1] "Avoiding the 'tax on God' dilemma when transitioning to dynamic rates." The article points out that more and more churches are falling victim to dynamic demand rate costs when demand is set for Sunday services.

Along with energy efficiency, net metering one-for-one for solar is an elegant way to solve this problem.

**Q8: MR. HATHAWAY, CAN YOU EXPLAIN WHAT HAPPENS TO ELECTRICAL CURRENT WHEN IT IS GENERATED AT OR NEAR THE LOAD?**

A8: Electric current will, as defined by Ohm's law,[2] flow in the greater amount through the path of least resistance. Although current will flow in other paths of higher resistance to ground, ***the majority of current*** will be found in the lowest resistant circuit(s) to ground. Long distance distribution wires have resistance to electric current associated with them. This resistance is directly proportional to the length of the wire and acts as additional resistance to electricity flowing back to the source. The longer the wires the more resistance. When electric current is generated near the load it will flow in the greatest

[1] Langley, Brad (2022) Avoiding the 'tax on God' dilemma when transitioning to dynamic rates, **Utility Dive**, https://www.utilitydive.com/spons/avoiding-the-tax-on-god-dilemma-when-transitioning-to-dynamic-rates/632110/.
[2] Ohm, Georg (1827) "The galvanic circuit investigated mathematically" (Ohm's Law)
$I = E/(r + Rl)$ ➔ $I = V / R$, https://en.wikipedia.org/wiki/Ohm's_law.

amount through the nearest closed switches and breakers onto electric ground. If all switches are suddenly opened at the main load of the generator source, then the current will now flow in greatest amount onto the connecting wires to the next nearest load and through its switches and breakers to ground. If those switches are opened the current will flow to the next nearest load and so on.

You can picture it like a water system with a pipe delivering water from a source to a use (or several uses) downhill. The water, once in the pipe, has nowhere to flow but down to the water uses. If additional sources are located near the uses, they will not flow back uphill but rather to the uses further downhill. If the spigot is closed at the first use the water will spill through the pipe to the next nearest use. If that spigot is closed it will flow to the next nearest use and so on. It will, for all intents and purposes, not flow back up the water pipe to the main source because in a multiple use system, there will always be a use open for the water in the neighborhood of uses.

Electric current operates in the same way. There are so many nearby loads that the electric current from a local generating source will always find a nearby load to flow through. The local electric current will always directly support the local electric loads, benefitting the local electric circuit.

**Q9: HOW DO THE ELECTRIC METERS OF NEXT DOOR HOMES THAT RECEIVE THIS NEARBY DISTRIBUTED GENERATED ELECTRICITY RECORD THAT ENERGY?**

A9: Electric meters do not typically distinguish between electricity from one source or another. The current that flows off of a solar generator system, when not being used by the owner, will flow onto the wires and through the neighbor's meter to their loads. To the neighbor, the meter simply records electricity used through the wires the house is connected to and would be billed for electricity as if it came from the power plant supplying the electric grid. However, the impact of this to the circuit feeding this neighborhood is a reduction in the apparent load on the circuit in direct amount equivalent to the capacity of the solar system on the home.

**Q10: WHY SHOULD THIS PRACTICE BE ENCOURAGED FROM AN ELECTRICAL SYSTEMS POINT OF VIEW?**

A10: Reducing load at the end point of a distribution system reduces the loading on the entire circuit feeding the neighborhood. For utilities with a summertime peak typically occurring in the afternoon, the aggregate summation of solar systems on multiple circuits means that summer peak load reductions are passed back to the substation reducing loading on the transmission lines feeding those substations. For reference of summertime peaking utilities see SACE's analysis.[3]

Georgia utilities are considered to be summer peaking in general. This means the electric utility can continue to serve a growing commercial and industrial peaking afternoon load with confidence that solar generation is offsetting that growing peak load. Ultimately, this means the utility can forestall otherwise necessary infrastructure investment (additional transmission, new substation transformers, reconductored

[3] Wilson, John; Shober, Maggie (2020) Seasonal Electric Demand in the Southeastern United States, **Southern Alliance for Clean Energy**, https://cleanenergy.org/wp-content/uploads/Seasonal-Electric-Demand-in-SE-SACE-Final.pdf.

distribution circuits) saving the entire rate base, otherwise adversely impacted, by those additional costs.

**Q11: DO OTHER STATES CONSIDER THE BENEFITS OF DISTRIBUTED GENERATION IN THIS WAY?**

A11: Yes, many utilities offer solar net metering with the general understanding that it positively impacts their system by offsetting any loss of revenue from the solar generator. Right now, solar net metering (one-for-one credit for solar generation) is offered in a majority of the states[4] (at least 33 by recent count) across the country. Some states have taken it a step further. In South Carolina, the Commission has introduced the first real-time priced solar net metering, varying the credit with the varying cost to serve electricity within time of use periods.[5]

**Q12: ARE THERE ANY STUDIES OF UTILITY SYSTEMS AS A WHOLE ACHIEVING SIGNIFICANT COST REDUCTIONS BY FOCUSING ON DISTRIBUTED GENERATION?**

A12: The most famous case of a long-term policy of distributed and demand-side focus by a utility was documented over a 20-year period by the Central Vermont Public System ("CVPS") and published in the *Electricity Journal*.[6] The report documented a focused utility approach towards investment in energy efficiency, demand response, and distributed

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[4] Pickrel, Kelly (2022) Update – Which States Offer Net Metering?, **Solar Power World**, https://www.solarpowerworldonline.com/2020/03/which-states-offer-net-metering/.
[5] Penrod, Emma (2021) South Carolina to Implement net metering settlement with time-of-use pricing; **Utility Dive**, https://www.utilitydive.com/news/south-carolina-to-implement-net-metering-settlement-with-time-of-use-pricin/600581/.
[6] See Spinner, Howard (1992) The Peak Shifts – 18 Years of Load Management, **The Electricity Journal,** and Spine, Havel Nos (2002) Demand Response: The Future Ain't what it used to be or is it?, **The Electricity Journal**.

generation technology in lieu of traditional capacity investment to increase overall system load factor from 55% to 70%.

**Q13: WHAT WAS THE REDUCTION IN SYSTEM COSTS FROM THE CVPS PROGRAM?**

A13: The project's proponent reported the system achieved an overall reduction of $10 million in system costs. If one were to extrapolate across the average ratepayer's bill, assuming 100% went back to the ratepayer, it would represent approximately $38 annually in savings (about 4%).

**Q14: WHAT IS SYSTEM LOAD FACTOR?**

A14: Load factor is the ratio of total energy used to serve the load of a given system divided by the total amount of energy that could be generated and pushed through the transmission and distribution system if the load was operated around the clock (24 hours per day, 365 days per year). The average load factor in the U.S. electrical system is about 50%. A 50% system load factor means that a system designed to supply 1 MW of electric capacity to serve a load and could deliver 8,760 MWh of energy to that load over the course of a year actually only supplies 4,380 MWh of electricity. Because most of the cost of electric supply is tied up in the capacity of the 1 MW system, including power generation, transmission and distribution, there is little additional cost in operating at a higher load factor other than the additional fuel to keep the plant operating. Therefore, a higher load factor results in a significant reduction in the cost per kWh for energy than a lower load factor does.

Consider load factor like you would consider operating a manufacturing plant on one, two, or three eight-hour shifts per day operations. The plant that operates on one shift per day shows 8 / 24 = 33% load factor. The plant that operates on two shifts per day shows 16 / 24 = 67% load factor. The plant that operates on three shifts per day shows 24 / 24 = 100% load factor. Obviously, all other things being equal, the high load factor manufacturing plant produces units at lower overall costs than the low load factor plant.

**Q15: HOW DOES A UTILITY INFLUENCE THE LOAD TO GET HIGHER SYSTEM LOAD FACTOR?**

A15: Central Vermont Public Service proved that long-term investment on the demand-side of the meter in multiple distributed, demand-response and energy efficiency technologies across the entire rate base, often referred to as Demand Side Management ("DSM"), will achieve the desired increase in load factor. They started in 1974 at 55% and it took them more than 20 years to raise it to 70%. Therefore, it should be the policy of the Commission to seek load factor improvement whenever it is low to produce an offsetting reduction in costs, especially when rates are under increased upward pressure.

**Q16: WHAT IS THE SYSTEM LOAD FACTOR IN GEORGIA?**

A16: According to the U.S. Energy Information Administration ("EIA") data for the state of Georgia,[7] peak capacity – including utilities, independent power production ("IPP") and combined heat and power ("CHP") – is 37,279 MW (37.279 GW). At 100% load factor, this would yield energy production of 37.279 GW x 8,760 hours per year = 325,564 GWHs

[7] Energy Information Administration, Georgia Electricity Profile (2020) https://www.eia.gov/electricity/state/archive/2020/georgia/.

per year. According to the same report net generating data is actually 120,126 GWHs per year. Load factor then is 120,126 / 325,564 = 36.8%. If we separate out data for what is owned and operated by Georgia utilities with peak capacity of 27,253 MW (27.253 GW) and net generation of 96,522 GWHs per year, the load factor calculation is only slightly better at 40.4%. In other words, even though ratepayers have essentially paid for a system capable of delivering up to 325,564 GWHs per year, the entire Georgia electric system barely achieves an average load factor slightly above a one shift operation.

**Q17: HAVE YOU EVER STUDIED LOAD FACTORS IN GEORGIA COMPARED TO OTHER NEIGHBORING STATES?**

A17: Yes, I wrote about it in *North American Clean Energy Magazine*, 2013.[8] I looked into the load factors of Tennessee, Alabama, Florida, South Carolina, North Carolina as well as Georgia from a period of 2008-2011. I found that during that time all states including Georgia saw a reduction in their system load factor and an increase in electric rates. Of all the six states Georgia's load factor was only better than Alabama's.

**Q18: WHICH STATES HAD THE BEST LOAD FACTORS?**

A18: Both North and South Carolina operate with a system load factor in the 50% range and their electric rates across all sectors (residential, commercial, industrial, and transportation) average at least 4.5% lower than Georgia.[9]

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[8] Hathaway, Alden (2013) Improving System Load Factor – A recipe for containing rates & growing renewable energy, **North American Clean Energy**, https://www.nacleanenergy.com/.
[9] U.S. EIA (2021) Total Electric Industry- Average Retail Price (cents/kWh), eia.gov/electricity/sales_revenue_price/pdf/table4.pdf.

**Q19: HOW MUCH COULD BE SAVED IF GEORGIA IMPROVED ITS LOAD FACTOR TO 70%?**

A19: If the Central Vermont Public System could achieve a 4% cost reduction for a 27.3% increase in load factor, then it seems quite possible that Georgia utilities with a 73.3% increase (40.4 -70 – approximately 2.7 times) could see a 2½ fold increase in cost reduction or approximately 10% downward pressure on electric costs. It would take an aggressive program of distributed generation focus to get there, but allowing solar to be part of the solution under net metering is certainly a step in the right direction.

**Q20: HOW DOES SOLAR WITH A LOW CAPACITY FACTOR CONTRIBUTE TO A HIGHER OVER ALL LOAD FACTOR?**

A20: For summer peaking utilities, as we have already established with the SACE material above, the peak output of the solar, occurring as it does in the mid-afternoon for areas on the western-end of the time zone (Daylight Savings) shortly after 2 PM, lines up well with the natural HVAC driven peak of the Georgia electric utility system. As such, distributed solar, especially when placed at the load end of a circuit, reduces that peak demand throughout the system with affects felt back to the supply. Yet, energy use at the load is not reduced as much, thus flattening the load curve and freeing up capacity in the circuit for other loads.

**Q21: HOW DOES SOLAR BEHIND-THE-METER BENEFIT THE SYSTEM WHEN APPLIED AT THE LOAD?**

A21: When solar is placed at the load it reduces peak demand across the board from the end circuit all the way back to the plants energizing the electric grid. The savings are seen in reduced distribution and transmission impacts, and improved operating efficiencies at the central generating stations. The projection of peak solar demand reduced through Drawdown Georgia's ambitious solar goal of 295,000 solar roofs by 2028 would yield as much as 1.475 GW of offsetting peak load reduction at the circuit end of the electric system about 5% of the system peak demand.

According to a well-publicized article in *Electricity Journal*, ***The Power of 5 Percent***, "Even a 5 percent drop in peak demand can yield substantial savings in generation, transmission, and distribution costs – enough to eliminate the need for installing and running 625 infrequently used peaking power plants and associated power delivery infrastructure. At the national level, this translates into savings of $3 billion a year, or $35 billion over the next two decades." [10]

**Q22: WHAT DO YOU ESTIMATE ARE THE SAVINGS OF A DISTRIBUTED ROOFTOP SOLAR PROGRAM TO GEORGIA RATEPAYERS?**

A22: Drawdown Georgia has placed a goal of 295,000 solar roofs each sized at 5 kW for increasing the amount of solar use by residential and small business consumers. This corresponds to a 5% reduction in peak demand and improvement in system load factor by the same amount.

[10] Faruqui, Ahmad, Ryan Hledik, Sam Newell, and Hannes Pfeifenberger (2007) The Power of 5 Percent, **The Electricity Journal**, https://doi.org/10.1016/j.tej.2007.08.003.

Using the Central Vermont Public Service (now Green Mountain Power) as a reference point; they raised their load factor by 27.3% from 55% to 70% and saw a corresponding 4% savings in utility costs. Thus, raising load factor by 5% should see a corresponding ((5/27.3) x 4%) = 0.7% decline in utility operating costs per year, seen primarily in distribution, transmission, and improved central plant operating cost savings.

If we use the metrics suggested by the article ***The Power of 5 Percent*** as a reference point and extrapolate across the national population (333.29 million) to Georgia's population (10.8 million), then the cost reduction projected can be calculated as: (10.8 / 333.29) x $3.0 Billion = $97.21 million per year. $97.21 million per year for 295,000 solar rooftop customers points to a net benefit of $329 per solar customer per year for all Georgia ratepayers.

**Q23: ARE YOU FAMILIAR WITH JAMES C. BONBRIGHT'S PRINCIPLES OF PUBLIC UTILITY RATES?**

A23: I am. In summation, Bonbright argues there are ten principles to modern rate design. The Bonbright principles are almost universally cited in rate proceedings throughout the U.S. In his testimony to the Commission in 2019, Dr. Ahmad Faruqui, Ph.D. claimed these ten principles can be essentially condensed to five core principles:

1. *Energy Efficiency* – The price of electricity should convey to the customer the cost of producing it, ensuring that resources consumed in the production and delivery of electricity are not wasted. If the price is set equal to the cost of providing a kWh, customers who value the kWh more than the cost of producing it will use the kWh, and customers who value the kWh less will not use it. This will encourage the development and adoption

of energy technologies that are capable of providing the most valuable services to the power grid, and the greatest benefits to electric customers as a whole.

2. *Equity* – There should be no unintentional subsidies among customer types. A classic example of the violation of this principle occurs under volumetric rate pricing structures (ie, cents per kWh). Since customers have different load profiles, "peaky" customers who use more electricity when it is most expensive, are subsidized by less "peaky" customers who overpay for cheaper off-peak electricity. Note that equity, in the electric sense, is not the same as social justice, which is related to differences in socioeconomic status rather than cost. The pursuit of one is not necessarily the pursuit of the other, and vice versa.

3. *Revenue Adequacy and Stability* – Rates should recover the authorized revenues of the utility and should promote revenue stability. Theoretically, all rate designs can be implemented to be revenue neutral within a class, but this would require perfect foresight of the future. Changing technologies and customer behaviors make load forecasting more difficult and increase the risk of the utility either under-recovering or over-recovering costs when rates are not cost reflective.

4. *Bill Stability* – Customer bills should be stable and predictable while striking a balance with other ratemaking principles. Rates that are not cost reflective will tend to be less stable over time, since both costs and loads are changing over time.

5. *Customer Satisfaction* – Rates should enhance customer satisfaction. Because most residential customers devote relatively little time to reading their electric bills, rates need to be relatively simple so that customers can understand them and perhaps respond to

the rates by modifying their energy usage patterns. Giving customers meaningful cost reflective rate choices will help enhance customer satisfaction.

**Q24: DO YOU AGREE THAT GEORGIA POWER HAS ENERGY EFFICIENCY BUILT INTO THE SUPPLY OF ELECTRICITY?**

A24: If by "Energy Efficiency" you are referring to the phrase above *"ensuring that resources consumed in the production and delivery of electricity are not wasted,"* then my response to this question is "no." I would note that operating the system at a low 40% load factor is wasting a significant amount of potential electricity resource, and therefore not energy efficient.

**Q25: DO YOU AGREE THAT THERE SHOULD NOT BE CROSS SUBSIDIZATION FROM ONE CUSTOMER TO ANOTHER?**

A25: Yes, I agree that we should seek fair and equitable rate structures that do not place a heavy cost shift burden on different sets of customers. Under standard retail residential rates there is a cost shift that occurs when a customer uses energy during the Georgia electrical system demand peak but pays no differently for the energy used than a non-peaky customer. The recent Georgia Power innovation with the smart rate is step toward addressing this problem, but misses the mark by not aligning the peak demand of the customer with the actual peak demand of the Georgia Power electric system. If that were done it would tend to keep system costs aligned with customer costs of using energy. However, like the churches I described earlier, because customers on a demand-based rate pay for demand set during off-peak times the mismatch remains.

**Q26: CAN SPENDING ON THE DEMAND SIDE OF THE METER TO INCREASE LOAD FACTOR SUPPORT REVENUE ADEQUACY AND STABILITY?**

A26: Yes. This is where the Commission can provide significant help to the utility to assure the recovery of authorized revenues and still encourage load factor improvement. The Commission has done a great job in rewarding Georgia Power in building a clean electric grid on the supply side. Now it can continue to build in clean electric capacity on the load side. The Commission should provide an additional sum (or return on equity) for all spending documented on the load side (demand-side) of the electric meter plus a bonus for increasing load factor since that would ultimately lead to lower system costs. Furthermore, spending on the demand-side of the meter will be cost-shared with the customer making the demand-side investment much less costly than on the supply-side. Solar at the load is the most effective technology to hit the peak demand of the Georgia electric system.

**Q27: DO YOU BELIEVE WE HAVE BILL STABILITY IN GEORGIA?**

A27: Historically, yes, but more recently, no. Georgia used to lead the nation with historically low electric rates. The average electric rates in Georgia are just under the national average. In the Southeast, only Florida has higher electric rates, and there is a good chance Georgia will soon overtake Florida, making it harder to recruit corporations when all its surrounding competitor states could boast lower electric costs.

And growth in Georgia will continue to put upward pressure on those rates if we continue to only focus on the supply-side for investment. According to an article in the

Center Square[11] citing a study by the Weldon Cooper Center for Public Service at the University of Virginia, Georgia's population is projected to expand by 19.5% between 2020 and 2040, moving it to the 5th most populous state in the country from 8th today. This growth requires a corresponding growth in the ability to meet electric load over the next 20 years. We have seen what a focus on "only the supply side of the equation" has wrought in terms of electric rate costs (with rate increases of more than 40%). As I have shown with only a 40% load factor there is plenty of capacity room on the load side of the meter.

It is now a great opportunity to put the more cost competitive "demand-side of the equation" investment to work to meet future load growth. Under the latter scenario, we would hope to see average kWh per customer reduced to make way for new customers coming online, all with zero carbon technology on the demand-side, continuing Georgia's leadership in a clean energy electric system at moderate electric prices.

**Q28: DO YOU AGREE THAT SIMPLE RATES ARE IMPORTANT FOR CUSTOMER SATISFACTION?**

A28: Yes, one of the reasons I advocate for solar net metering is that I agree with that principle above as electric customers understand the one-for-one credit when they generate their own solar energy, especially as they believe they are doing what is right for a resilient and robust electric grid and for the environment. Any rate plan that recalculates the buyback for solar

[11] Stebbins, Samuel (2022) How Georgia's Population Will Change in the Next 20 Years, **The Center Square**, https://www.thecentersquare.com/georgia/how-georgia-s-population-will-change-in-the-next-20-years/article_1fdab962-80de-5efe-8711-33296016f3aa.html.

based on what is generated at a different rate than what they pay introduces confusion and suspicion.

**Q29: DO YOU AGREE WITH AHMAD FARUQUI'S REFORMED VIEWS ON NET ENERGY METERING?**

A29: Yes. As you know, in 2019 the esteemed Dr. Ahmad Faruqui testified on behalf of Georgia Power that net metering could cause a cost shift from solar owner to non-solar owner in the rate base introducing the question of equity in the rates and revenue destabilization for the company.

I draw your attention to the September 27, 2022 Issue of *PV Magazine*[12] to the article entitled "Why did I reform my views on Net Energy Metering (NEM)?" by Dr. Ahmad Faruqui. In the article Dr. Faruqui claimed his position against NEM policies had him standing on the wrong side of history. He said people "rich and poor, want to install solar panels. They enhance affordability and green energy. When paired with batteries, they enhance local resilience. They lower investments in the distribution and transmission system."

In the article, Dr. Faruqui specifically states "I also believe that states where solar deployment is in the early stages, and where less than 5% of customers have deployed solar roofs are at a very different stage of the game and should stick with NEM in its current form."

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[12] Faruqui, Ahmad (2022) Why did I reform my views on net energy metering (NEM)? **PV Magazine**, https://pv-magazine-usa.com/202209/27/why-did-i-reform-my-views-on-net-energy-metering-nem/.

**Q30: HAVE YOU SEEN ANY EVIDENCE THAT DISTRIBUTED SOLAR HAS REDUCED DISTRIBUTION COSTS?**

A30: Yes. I had the opportunity to attend the National Association of State Energy Officials conference in St. Petersburg, Florida Wednesday, October 12, where Dr. Justin M. Hill, Ph.D. PE, Senior Research Engineer for Southern Company Services Inc. was presenting the results on two solar microgrid residential projects for moderate income neighborhoods in Alabama and Georgia.[13] The solar microgrids were successful in their ability to island full neighborhoods - completely separating from the electric grids for periods. Dr. Hill stated, "There was significant reduction in distribution cost required including substation transformer. For the Alabama project the reduction in required equipment size was 50%, freeing up capacity for other loads."

**Q31: WHAT ARE THE CONCLUSIONS OF YOUR ANALYSIS?**

A31: A lot has been said in this docket about there being a cost shift from solar homeowner to the rest of the ratepayers. My testimony should put significant doubt on the Company's position. Furthermore, it should be recognized that if the value of the solar generation paid by the majority of Georgia utilities remains at the low marginal value that it has been for the past decade, then we can expect relatively few solar homes to be advanced in Georgia. This means that the majority of the IRS federal tax credit (recently restored back to 30% by the Inflation Reduction Act) supported by the American taxpayer, including Georgians, will go to US citizens outside of the state of Georgia. It will be ironic that a position

[13] Hill, Justin (October 2022) Smart Neighborhoods (aka Connected Communities), Presentation at National Association of State Energy Officials, https://annualmeeting.naseo.org/data/energymeetings/presentations/Hill.pdf.

maintained by the policy of this Commission, would result in the shift of up to $1 billion in taxpayer-funded investment tax credits (the amount of credit that would be availed to 295,000 solar homeowners as per the Drawdown Georgia goal) away from Georgians to U.S. taxpayers outside the state of Georgia. (See AMH-Exhibit-2).

In conclusion, if distributed solar helps lower the cost for the entire electric system, that cannot be considered as a cost shift subsidy. In fact, the cost savings of between $300 and $400 per solar home in Georgia suggests the Commission, through Georgia Power, should be doing all it can to see that consumers can put solar on their roofs to help lower costs for all ratepayers. Ensuring access to net metering one-for-one credit for all solar at the load is the simplest way to proceed.

**Q32: DOES THIS CONCLUDE YOUR TESTIMONY?**

A32: Yes.

# Attachments

**AMH-Exhibit-1**

# ALDEN MOINET HATHAWAY II, P.E., C.E.M.

**4025 Pinebrook Circle** **PHONE: 540-207-3142**
**Cumming, Georgia 30028**
**email: ahathaway@sterlingplanet.com**

## SUMMARY of EXPERIENCE

An energy visionary, Alden Hathaway, possesses the conviction that we have the energy technologies to solve our environmental problems while saving money and energy for all.

Mr. Hathaway is Program Director for Power and Renewables, for Pond and Company where he leads the company in renewable energy markets and consulting initiatives with utilities, governmental and corporate customers. Mr. Hathaway is applying his nearly 40 years of energy and renewable energy experience to assist Pond's traditional customers transition and succeed in the emerging market for clean energy.

Mr. Hathaway is an energy and environmental marketing and professional engineer whose career spans over thirty-nine years of experience in energy: sales/marketing; training and project management. His particular skills include:

- National Account/ Utility/Government Marketing and Green Power Programs
- Product Development and Sales
- Marketing Management, Training and Consulting
- Domestic and International Small and Large Renewable Power Plant Development

## EXPERIENCE:

**Sterling Planet, Inc and Sterling Energy Assets, LLC:** ***Sr. Vice President, Business Development:*** **Alpharetta, GA 2021 – Present.** Returned under special assignment to develop, patent, and launch a new Solar program for the commercial market.

**Pond and Company:** ***Program Director Power and Renewables:*** **Peachtree Corners, GA, Dec, 2020 – 2021.** Develop new Power Initiatives for utilities supporting transmission and distribution needs incorporating new renewable sources. Support renewable power development including microgrids for utilities, federal govt and commercial customers. Support renewable integration into other Pond businesses, including buildings, transportation and natural gas companies.

**Sterling Planet, Inc and Sterling Energy Assets, LLC:** ***Sr. Vice President, Business Development:*** **Alpharetta, GA 2007 – 2020.** Develop new programs and products for Electricity and Environmental Markets, including Renewable Energy Certificates, Greenhouse Gas Offsets, Energy Efficiency Credits and Utility Energy Efficiency and National account Sustainability Programs. Integrate new products into Sterling offerings to offer customers coordinated approach to climate neutral sustainability goals. Work with the Chairman to expand Sterling's energy and environmental programs and opportunities into the International Arena, including developing world renewable energy projects and services.

**Solar Light for Africa:** ***Founding Board Member*****: Melbourne, FL—1997 - Present.** Cofounded and launched Solar Lighting program in rural Africa which successfully installed over 2500 solar systems in Uganda, Tanzania, Rwanda, Ethiopia, Sudan, Ghana, Congo, Sierra Leone and Liberia over 20 years.

**AMH-Exhibit-1**

**ERT, Inc:** ***Director, EcoPower® Programs:*** **Washington, DC --1999 - 2007.** Coordinated Environmental Resources Trust (ERT) EcoPower® and Renewable Energy Certification Program for National Accounts, Utilities, Federal, State and Municipal Governments; Helped launch EPA Green Power Partnership Program by developing National REC Response; The first to Certify National RECs/Issue REC Standard 2002; Signed the first Utility REC Contract for Government green power.
**SOLAREX:** ***Director of Marketing and Distribution:*** **Frederick, MD—1996 - 1997.** Managed a $1MM budget for the Marketing and Distribution Departments and six direct reports. Coordinated Distributor Program for over 70 distributors in 60 countries; Product Mgr for Millennia Thin Film Product

**ICF Kaiser:** ***Project Manager*****: Washington, DC—1994 - 1996 & 1997 - 1999.** Market Launch and Marketing Support for EPA's Green Lights; Energy Star Buildings; Green Power Partnership Programs. Managed Implementation Team of 16 engineers for Green Lights and Energy Star Buildings Partners.

**GTE:** ***Manager, Energy Programs*****: Sylvania Lighting Division: Danvers, MA, 1991 - 1993**
Managed Sylvania's activities in EPA's Green Lights program by merging activities of Sylvania Lighting Services with manufacturing sales force. Developed energy management packages and acted as energy spokesman for Sylvania Lighting Division.
***Senior Lighting Engineer*****: St. Louis, MO - Washington, DC—1983 - 1991**
Technical Advisor to District Sales Manager; responsible for training and assist in managing district sales personnel. Conducted lectures, clinics, and seminars regarding energy and utility rebate opportunities. Liaison to government for efficient lighting legislation and consulted with EPA in developing Green Lights Program.

**Georgia Power Company:** ***Assistant Marketing Engineer*****: Columbus Georgia--1982-1983**
Managed Manchester District electrical marketing effort. Assisted customers with energy management needs. Responsible for commercial electric revenues.

**EDUCATION:**

**University of Virginia**: Charlottesville, Virginia--B.S.E.E. January, 1982

**ADVISORY**:

***Member***, **White House** task force on Global Climate Change, 1993 - 1994
***Member***, ASHRAE/IES Energy Management Committee, 1992 - 1993

**AWARDS**:

***U.S. Patent, Provisional, 2017:*** DC Lighting System
***Legend in Energy Recognition, 2013:*** Recognized by the Association of Energy Engineers
***U.S. Patent, 2013:*** Method and Apparatus for Determining Energy Savings by Using a Baseline Energy Use Model
***Regional Wind Advocacy Award - 2005:*** USDOE Wind Powering America – Recognized for support of Wind Power in area Air Pollution Compliance plans;
***Outstanding Environmental Volunteer - 2000***: Loudoun County– Recognized for solar power plant development at Franklin Park Performing Arts Center;
***ICF Service Award, 1995***: Recognized for the market development of the ENERGY STAR Buildings Program.
***U.S. Patent, 1991:*** "Master-Satellite Fluorescent Lighting System"
***Lighting Engineer Award of Merit, 1988:*** GTE Sylvania – For Marketing of Octron T-8 System

**AMH-Exhibit-1**

**CERTIFICATION:**

***Georgia Engineer In Training*** **(EIT)** April, 1983
***Georgia Professional Engineer*** **(P.E.) Electrical Power Discipline** June, 2010 – Present
***South Carolina Professional Engineer*** **(P.E.), Electrical Power Discipline** May, 2017 - Present
***Certified Energy Manager*** **(CEM)** April 1993 - Present

**PUBLICATIONS**:

Two books and twenty+ articles published (trade magazines, conference proceedings and technical journals):

"New Plans to Lighten Building Construction Costs," Consulting Specifying Engineer, News and Review Section, May, 1989.

"Lighting Efficiency: A Simple Solution to a Complex Problem," Public Utilities Fortnightly, June, 1990.
"Tuning for Energy Efficiency" Intelligent Buildings Quarterly, February, 1992.

"Master/Satellite Lighting Systems Provide High Energy Savings" Mainlighter, March, 1992.

"Global Warming in the Office Environment," Mainlighter, July, 1992.

"Solar Assisted Lighting" Today's Lighting Distributor, a NAILD publication, June, 1993.

"Tuning for Energy Efficiency" Energy Engineering, September, 1993

"The Environmental Impact of Energy Efficiency" Strategic Planning for Energy and the Environment, March, 1994.

"Financing Options for Energy Efficient Upgrades" Building Operating Management, September, 1994.

"A Lighting Upgrade Must, parabolic luminaires provide energy-efficient, uniform illumination" Green Lights and Energy Star Update, October, 1995

"HVAC Load Reductions Lower Energy Bills" Green Lights and Energy Star Update, July, 1995.

"The Link between Lighting and Cooling" Maintenance Solutions, July, 1995.

"Solar Assisted Lighting for Developing Nations" World Aid Directory, April, 1997.

"Solar Powered Buildings: Power Plants for the 21st Century" Presentation and Article at the World Energy Engineering Congress, Atlanta and Proceedings, November, 1997.

"Commercial Buildings as Power Plants in a Deregulated Utility Market" Proceedings for Solar '98, American Solar Energy Society, June, 1998.

"Changing the Facility Energy Load Profile (A Rate Cost Mitigation Strategy to Prepare for Utility Deregulation)" Energy User News, November, 1998, (Co-author: David Smith, Director Facilities, MCG)

Building an Affordable Solar Home - Solving a Nation's Quest for Sensible Energy and Environmental

**AMH-Exhibit-1**

Strategy, 2004 - Self-published book - building and fine tuning of the Hathaway Solar Patriot Home.

"Empowering Africa – How Solar Energy Advocates are Bringing Light and Hope to Rural East Africans" Solar Today, July/August 2005 (Co-author: Charolett Baker, Executive Director, Solar Light for Africa)

"Solar Charging Stations – Key to Reviving American Auto Industry" Solar Today, September/October 2009

"Improving System Load Factor - A Recipe for Containing Electric Rates and Growing Renewable Energy" North American Clean Energy, Jan, 2013

"Measuring and Rewarding Energy Efficiency" North American Clean Energy, May, 2013 (co-author: Govi Rao, President of Noveda Technologies)

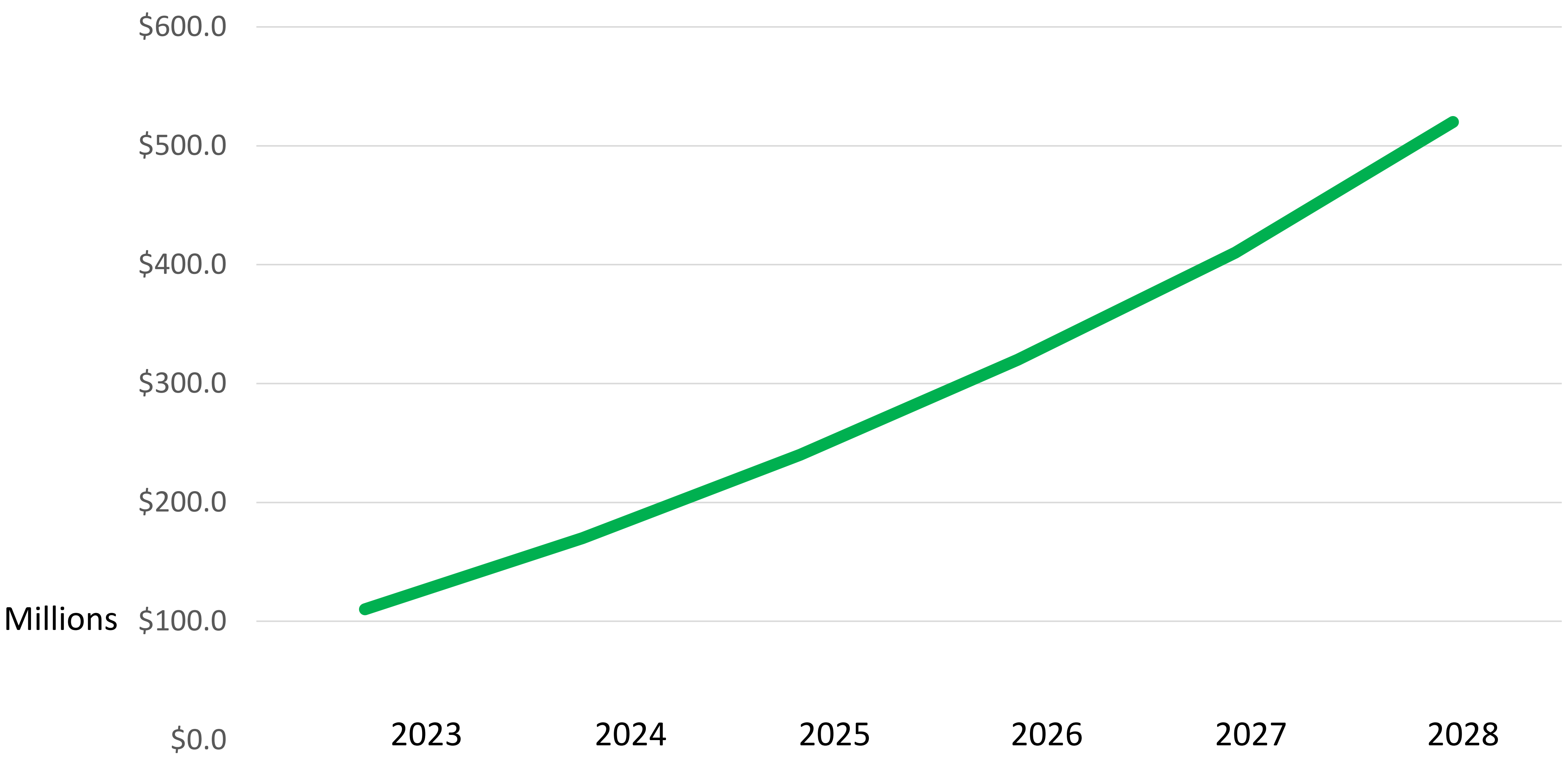
"A Call for Net Zero Energy" North American Clean Energy, Jan, 2016
http://www.nacleanenergy.com/articles/22155/a-call-for-net-zero-energy

Energy Independence – An Individual Pursuit for Energy Freedom, May, 2022, River Publishing, Book released for Association of Engineers (co-author: Tripp Hathaway)

Direct Testimony of Alden M. Hathaway II.
Southern Alliance for Clean Energy & Southface Energy Institute, Inc.
Georgia PSC, Docket No. 44280

AMH-Exhibit-2

# Tax Shift of Funds to Other States from Georgia Citizens Each Year Solar NEM Is Unavailable




Based on Georgia Drawdown goal of 295,000 Solar Rooftops by 2028 at $6,000 IRS Tax Credit per Installation