BEFORE THE

GEORGIA PUBLIC SERVICE COMMISSION

In Re: Georgia Power Company's 2022 Integrated Resource Plan	Docket No. 44160
And Georgia Power Company's Application For The Certification, Decertification, And Amended Demand-Side Management Plan	Docket No. 44161

Direct Testimony of Jason Frost

On Behalf of Sierra Club

May 4, 2022

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INTRODUCTION AND PURPOSE OF COMMENTS

Q Please state your name, title, and employer.

A My name is Jason Frost. I am an Associate at Synapse Energy Economics, Inc. ("Synapse"). My business address is 485 Massachusetts Avenue, Suite 3, Cambridge, Massachusetts 02139.

Q Please describe Synapse Energy Economics.

A Synapse is a research and consulting firm specializing in energy and environmental issues, including transportation electrification, electric generation, transmission and distribution system reliability, ratemaking and rate design, electric industry restructuring and market power, wholesale electricity markets, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power. Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, state energy offices, environmental organizations, federal government agencies, and utilities.

Q Please summarize your work experience and educational background.

A At Synapse, I work on numerous topics with focuses on transportation electrification and decarbonization, wholesale electricity market issues, and electric system modeling. I serve as the Transportation topic area lead at Synapse. I am one of the developers of Synapse's Electric Vehicle Regional Emissions and Demand Impacts (EV-REDI) tool, which calculates the impacts of electric vehicles (EVs) on electricity consumption, greenhouse gas emissions, and criteria pollutant emissions to inform transportation decarbonization strategies. I have used consumer adoption models to analyze the impacts of technological changes and climate policies on EV adoption trajectories. This work has involved the evaluation of the impacts of policies such as EV incentives and carbon prices on EV adoption and greenhouse gas emissions in the states of New York and Rhode Island. For the city of Burlington, Vermont, I modeled pathways to net zero emissions in the transportation sector. I have also evaluated the bill impacts of rate

designs for EVs. In California, I evaluated the net revenues to the utility system as a result of EV adoption in the two largest investor-owned utilities' service territories. I have also analyzed commercial and industrial EV charging rate designs to recommend best practices in setting such rates.

My other areas of work include wholesale electricity markets and electric system modeling. My work in wholesale markets involves in-depth analysis and evaluation of wholesale electricity market rules, including those of ISO New England and PJM. In addition to my work on wholesale electricity markets, I have run the EnCompass capacity expansion model to develop resource plans to compare with utility integrated resource plans (IRPs).

I hold a Bachelor of Science in Physics from Stanford University in Stanford, California. A copy of my current resume is attached as Exhibit JF-1.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of Sierra Club.

Q Have you testified previously before the Georgia Public Service Commission?

A No.

Q What is the purpose of your testimony in this proceeding?

A The purpose of my testimony is to highlight the need for and benefits of incorporating electric vehicle adoption and related planning into future Georgia Power IRPs. Because this has not been adequately incorporated into the current IRP process, I recommend that the Commission open an investigatory docket to coordinate the buildout of EV charging infrastructure in the context of Georgia's rapidly growing EV fleet and incoming funding sources. A new docket can function as an interim measure until Georgia Power can fully integrate EV adoption and related planning into future IRPs. Currently, this important topic is underrepresented in Georgia Power's resource planning.

To illustrate the need for this type of planning, my testimony first provides a forecast of light-duty EV sales and stock trajectories in Georgia under a business-as-usual scenario and a policy-based scenario. Using these forecasts, I then provide estimates for

charging infrastructure investment needed in Georgia Power's service territory to meet EV charging need. My testimony then compares already authorized investments and available federal funding to the projected total infrastructure need. Finally, my testimony describes the benefits EV adoption can bring to Georgia and why an investigatory docket is needed to maximize the benefits of EV adoption for Georgia ratepayers.

2. FINDINGS AND RECOMMENDATIONS

Q Please summarize your primary conclusions.

A My conclusions are as follows:

1. Under a middle-of-the-road Business as Usual (BAU) scenario in Georgia, EV sales will reach 34 percent of new light-duty vehicle sales in 2030, and 60 percent by 2035. In Georgia, this will result in an estimated 731,000 total light-duty EVs on the road in 2030 and 1.8 million EVs in 2035, compared to only 77,000 EVs today.

2. Within Georgia Power's service territory, this EV fleet will require an estimated 6,300 public EV chargers in 2030 and over 15,000 in 2035, compared to 3,552 public charging ports today.[1] About 25 percent of new chargers will need to be DC fast chargers.

3. I conservatively estimate that building these chargers will require an investment of $302 million by 2030 and $740 million by 2035, in 2022 dollars.

4. Planning for and facilitating EV adoption will benefit Georgia ratepayers.

   (a) By displacing gasoline-powered cars, EVs will reduce annual gasoline expenditures in Georgia Power's service territory by $515 million in 2030 and $1.3 billion in 2035, in 2022 dollars.

[1] These numbers only include the sum of DC fast chargers and Level 2 public chargers. These numbers assume 66% of EV owners have access to at-home charging.

(b) If charging occurs mostly off-peak, EV adoption will benefit non-EV drivers by using grid infrastructure more efficiently and spreading fixed utility costs over greater electricity sales.

5. The IRP does not thoroughly address how Georgia Power will contribute to the deployment of charging infrastructure at scale or discuss strategies the Company will use to manage EV charging loads beyond its existing EV rate offering.

6. Georgia Power can and should play a role in facilitating EV adoption. The Company can:

(a) accelerate the deployment of EV charging infrastructure, such as by building out robust highway distribution systems and chargers or by building all the infrastructure needed to allow for a make-ready infrastructure approach,

(b) support EV charging installation in harder to reach sectors like multi-unit dwellings to advance equitable EV charger access, and

(c) continue to refine and develop rate structures that maximize the potential benefits of EVs as flexible load.

While such planning and costs can be folded into future IRPs and rate cases, given the limited attention provided to the issue in this IRP, it would be prudent to open an EV-specific docket in the next year or so, before the next IRP, to develop a plan that maximizes benefits to the people of Georgia.

Q Please summarize your primary recommendations.

A Adequate planning to maximize the benefits of transportation electrification cannot wait until the next IRP, as vehicles are long-lived assets and decisions made by customers today will have impacts for many years to come. Therefore, I recommend that:

- In the next year, the Commission open a docket to investigate Georgia Power's role in facilitating the deployment of charging infrastructure across the state and maximizing the benefits of EV deployment for Georgia's ratepayers through rate

design. Without a clear plan for the build out of EV charging infrastructure and rate designs that encourages charging at low-cost hours, EV adoption in Georgia could be delayed and the full benefits of EV adoption for Georgia ratepayers will not be realized.

- The Commission direct Georgia Power to include greater transportation electrification planning in its future IRPs.

3. GEORGIA POWER'S 2022 IRP INADEQUATELY ADDRESSES THE IMPLICATIONS OF ELECTRIC VEHICLE ADOPTION

Q To what extent does Georgia Power's 2022 IRP address and plan for EV deployment?

A Georgia Power's 2022 IRP mentions EVs in two contexts; the first is as an example of a distributed energy resource.[2] The second is in the context of a pilot project aimed at recycling EV batteries into an energy storage resource. [3] The IRP mentions supporting the advancement of the transportation sector through decarbonization technologies and "enabling infrastructure."[4] Georgia Power's 2022 budget and load forecast also incorporates EV load growth and load shapes.[5] The IRP does not, however, adequately address how it will facilitate the deployment of the growing amount of EV charging infrastructure required or manage the resulting distribution upgrades to minimize costs to ratepayers.

Q Why is treatment of EV adoption inadequate in this IRP context?

A Georgia Power is aware of its responsibility, and is already taking some steps, to account for the impacts of a rapidly growing EV fleet on load growth, as EVs will be a transformational new source of load as well as a valuable distributed energy resource

[2] Georgia Power Company. *2022 Integrated Resource Plan*. Page 9-59. Available at https://psc.ga.gov/search/facts-document/?documentId=188519.
[3] Georgia Power Company. *2022 Integrated Resource Plan*. Section 13.3 and Page 3-20.
[4] Georgia Power Company. *2022 Integrated Resource Plan*. Page I-173.
[5] Georgia Power Company. *Budget 2022 Load and Energy Forecast 2022-2041*. Page 120. Available at https://psc.ga.gov/search/facts-document/?documentId=188519.

(DER) for the grid. But Georgia Power has a greater role to play in planning a prudent and efficient response to rapidly accelerating growth of EV adoption that should include:

(a) building out make-ready infrastructure to take advantage of the utility's strength as a source of low-cost capital,

(b) supporting EV charging installation in harder to reach sectors like multi-unit dwellings to advance equitable EV charger access, and

(c) continuing to develop and evaluate rate structures that maximize the potential benefits of EVs as flexible load that can be charged during off-peak hours.

By failing to address these elements of EV adoption in the context of its IRP, Georgia Power is missing an opportunity to plan a response that maximizes benefits to the people of Georgia. Robust EV planning is particularly urgent in light of the need to make efficient use of federal funds from the Infrastructure Investment and Jobs Act, which, through the National Electric Vehicle Initiative alone will channel over $134 million into Georgia for EV charging on highways over the next five years, beginning in the fall of 2022.

Q What should Georgia Power's role be in facilitating the adoption of EVs in its service territory?

A Georgia Power has important roles to play both in coordinating and preparing for the deployment of charging infrastructure at scale and in encouraging charging at the lowest cost times for the grid. The specific actions that Georgia Power plans to take should be incorporated into the Company's IRP process going forward.

However, since Georgia Power has not adequately addressed these issues in this IRP, and given the oncoming, rapid increase in charging needs, these questions should be addressed in the near term by opening an investigatory proceeding. This proceeding should address charging infrastructure deployment, rate design, and other elements of planning for EVs to ensure that the transition to electrified transportation maximizes benefits to Georgia Power's customers and the residents of Georgia at large.

4. EV ADOPTION WILL INCREASE RAPIDLY IN A BUSINESS-AS-USUAL SCENARIO

Q What types of EVs should Georgia Power Plan for?

A Georgia's current EV fleet is composed of light-duty EVs, primarily used for passenger transport, as well as medium and heavy-duty EVs in public and commercial fleets, such as the more than 30 electric buses in the University of Georgia's fleet.[6] In this testimony, I focus on light-duty EV adoption, which so far has progressed at a faster pace and for which more modeling tools are available.

My focus on light-duty vehicles here does not mean that medium- and heavy-duty EVs should be ignored. In fact, because medium- and heavy-duty EV adoption will also grow, the forecasts in my testimony for EV stock, charging need, charging cost, and benefits to Georgians of EV adoption should all be treated as conservative estimates. Medium- and heavy-duty vehicles have a diverse set of use cases and specific needs. Many will require larger batteries and faster charging capabilities due to their larger sizes or duty cycles, and Georgia Power should also plan for their adoption and work with customers to understand where additional distribution capacity and charging infrastructure will be needed. The complexities associated with integrating medium- and heavy-duty vehicles underscore the need for a separate proceeding to plan for EVs in Georgia, and for Georgia Power to address these issues in future IRPs.

I note that I use the term "EVs" to describe both fully electric Battery Electric Vehicles (BEVs) as well as Plug-in Hybrid Electric Vehicles (PHEVs), which have both a small battery and a gasoline engine. While BEV adoption is expected to grow at the

[6] University of Georgia Transportation and Parking Services. "Electric Buses." *Transit.* Available at https://tps.uga.edu/transit/electric-buses/.

fastest rate, forecasts including BloombergNEF, LMC Automotive, and McKinsey point to an approximately 10 to 15 percent PHEV share of all light-duty EVs in 2030.[7, 8, 9]

Q How is light-duty EV adoption expected to grow from now to 2035?

A National-level EV adoption forecasts predict that in 2030, between 23 percent and 43 percent of new light-duty vehicle sales will be EVs (Figure 1).[10, 11, 12] These projections align with private-sector EV sales goals from some of the largest-selling car companies in the United States. Ford, for example, expects 40 to 50 percent of its global vehicle volume to be fully electric by 2030.[13] GM will sell only zero-emissions vehicles by 2035.[14] Volkswagen is targeting 55 percent of its U.S. vehicle sales to be fully electric by 2030 and Nissan projects that 40 percent of its U.S. sales will be EVs by 2030.[15, 16]

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[7] Wayland, Michael. 2021. "Americans are buying Teslas, not EVs, but experts say that's about to change." *CNBC.* Available at https://www.cnbc.com/2021/10/26/americans-are-buying-teslas-not-evs-heres-why-thats-about-to-change.html.

[8] BloombergNEF. *Electric Vehicle Outlook 2021*. Available at https://about.bnef.com/electric-vehicle-outlook/.

[9] Fischer, M., N. Kramer, I. Maurer, R. Mickelson. 2021. "A turning point for US auto dealers: The unstoppable electric car." *McKinsey & Company.* Available at https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/a-turning-point-for-us-auto-dealers-the-unstoppable-electric-car.

[10] Wayland, Michael. 2021. "Americans are buying Teslas, not EVs, but experts say that's about to change." *CNBC.* Available at https://www.cnbc.com/2021/10/26/americans-are-buying-teslas-not-evs-heres-why-thats-about-to-change.html.

[11] BloombergNEF. *Electric Vehicle Outlook 2021*. Available at https://about.bnef.com/electric-vehicle-outlook/.

[12] Fischer, M., N. Kramer, I. Maurer, R. Mickelson. 2021. "A turning point for US auto dealers: The unstoppable electric car." *McKinsey & Company.* Available at https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/a-turning-point-for-us-auto-dealers-the-unstoppable-electric-car.

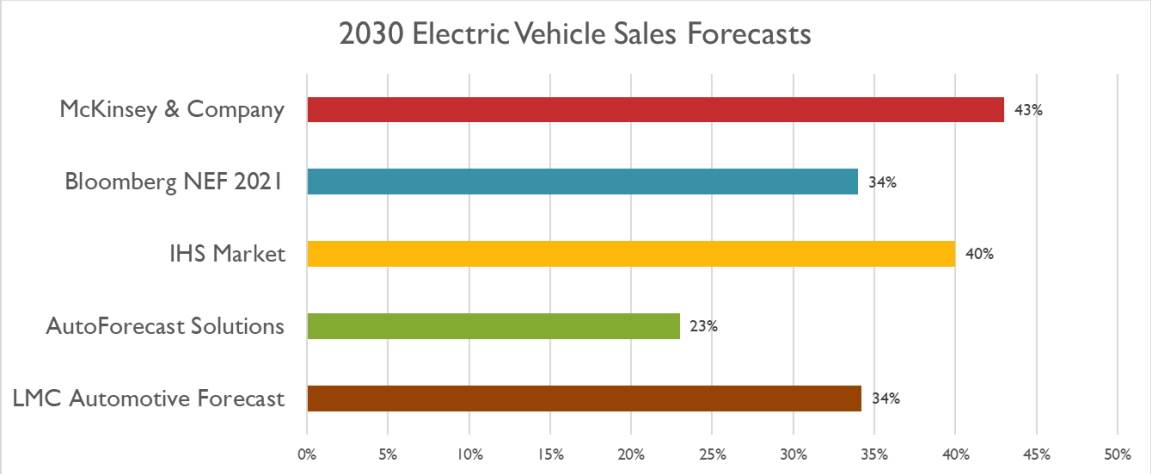
[13] Ford. 2021. "Ford To Lead America's Shift To Electric Vehicles With New Mega Campus In Tennessee And Twin Battery Plants In Kentucky; $11.4B Investment To Create 11,000 Jobs And Power New Lineup Of Advanced EVs." Available at https://media.ford.com/content/fordmedia/fna/us/en/news/2021/09/27/ford-to-lead-americas-shift-to-electric-vehicles.html.

[14] Boudette, N., C. Davenport. 2021. "G.M. Will Sell Only Zero-Emission Vehicles by 2035." *The New York Times*. https://www.nytimes.com/2021/01/28/business/gm-zero-emission-vehicles.html#:~:text=General%20Motors%20said%20Thursday%20that,trucks%20and%20sport%20utility%20vehicles.

[15] Volkswagen. 2022. "Volkswagen unveils $7.1 billion commitment to boost product line-up, R&D, manufacturing in North America." Available at https://media.vw.com/en-us/releases/1668#:~:text=By%20locally%20integrating%20its%20combustion,be%20fully%2Delectric%20by%202030.

[16] Preston, B., J. Bartlett. 2022. "Automakers Are Adding Electric Vehicles to Their Lineups. Here's What's Coming." *Consumer Reports.* Available at https://www.consumerreports.org/hybrids-evs/why-electric-cars-may-soon-flood-the-us-market-a9006292675/#3.

Figure 1. Five Forecasts for 2030 EV Sales



Q How will EV adoption in Georgia Power's service territory compare to national trends?

A I anticipate EV adoption in Georgia Power's service territory will generally follow national EV adoption forecast trends. In 2021, EVs accounted for 4.65 percent of light-duty vehicle sales nationally and 3 percent of light-duty vehicle sales in Georgia.[17] While this places Georgia slightly behind the national rate of EV adoption, Georgia Power's service territory skews urban and suburban (areas that tend to have more charging infrastructure available) relative to the state as a whole, which means that Georgia Power's service territory is likely to see EV adoption rates closer to the national average. Also, as EVs become a mass market offering and as private companies work toward stated EV sales goals, sales levels will likely become more consistent across states as purchases are less impacted by the presence of early adopters.

Q How quickly will EV sales and stock in Georgia change between now and 2035?

A To examine the impact of EV deployment in Georgia, we modeled business-as-usual ("BAU") EV growth in the EV fleet based on the BloombergNEF 2021 sales forecast ("BNEF 2021"), which predicts that in 2030, 34 percent of light-duty vehicle sales will

[17] Alliance for Automotive Innovation (2022). Advanced Technology Vehicle Sales Dashboard. Data compiled by the Alliance for Automotive Innovation using information provided by IHS Markit (2011-2018, Nov 2019-2021) and Hedges & Co. (Jan 2019-Oct 2019). Data last updated 3/24/2022. Retrieved 4/19/2022 from https://www.autosinnovate.org/initiatives/energy-and-environment/electric-drive.

be EVs.[18] We chose BNEF 2021 because it is in the middle of the range of current forecasts and it is well-documented and annually updated. We developed an S-shaped technology adoption curve for EV sales that reaches 34 percent by 2030 and modeled the impact of this sales trajectory on the size of Georgia's light-duty EV fleet from 2022 to 2035.[19]

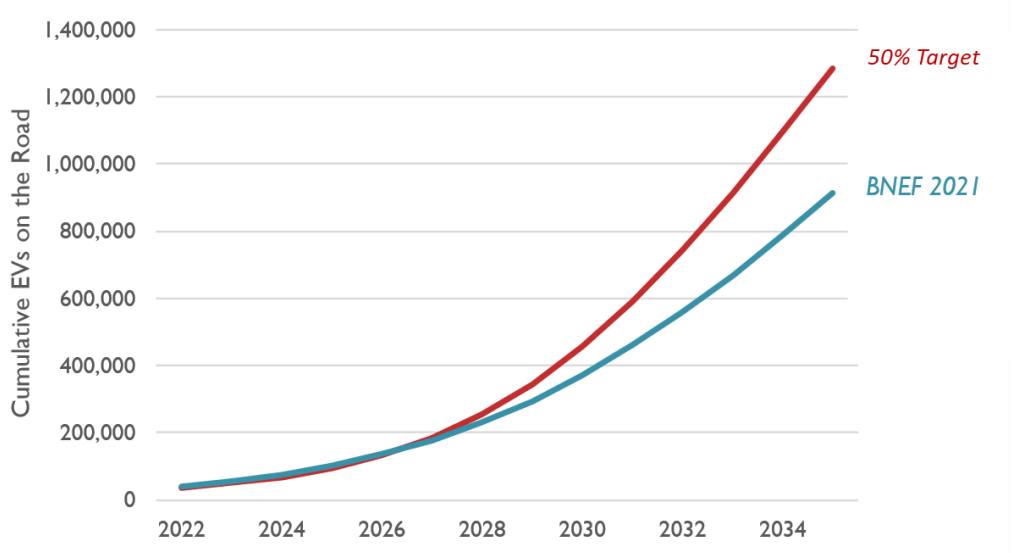
My analysis indicates that reaching 34 percent of new car sales in 2030 results in the light-duty EV fleet in Georgia reaching about 730,000 vehicles by 2030, with over 150,000 purchased in 2030 alone. By 2035, continued growth will bring the Georgia EV fleet to 1.8 million. In a higher adoption scenario of 50 percent EV sales in 2030, the light-duty EV fleet reaches 900,000 vehicles by 2030 and 2.5 million by 2035.

Georgia Power serves approximately 51 percent of Georgia's residential electric customers, so I estimate that approximately 51 percent of the associated EV load growth will occur within Georgia Power's service territory, creating a transformational need for charging infrastructure. Given that Georgia Power's service territory skews urban and suburban relative to the state as a whole, this is likely a conservative estimate. In Georgia Power's service territory, under BAU EV adoption, I project there will be 370,000 EVs on the road in 2030 and 910,000 in 2035. In the higher EV adoption scenario with 50 percent EV sales in 2030, the number of EVs in Georgia Power's service territory rises to 460,000 in 2030 and 1.3 million in 2035. These growth trajectories are shown in Figure 2, below.

[18] BloombergNEF. Electric Vehicle Outlook 2021. Available at https://about.bnef.com/electric-vehicle-outlook/.

[19] The Bass Diffusion model, which forecasts S-shaped technology adoption, describes how new technologies become accepted by different groups of people. First, early adopters try the technology and it gains market share slowly. Later on, the technology gains mass market appeal and the majority of people adopt it. Finally, laggards adopt the technology after it has already become widely accepted.

Figure 2. EV Stock in Georgia Power's Service Territory Under a BAU Scenario (34% sales in 2030) and 50% Sales in 2030 Scenario



5. EV ADOPTION WILL REQUIRE A GROWING AMOUNT OF CHARGING INFRASTRUCTURE

Q What types of chargers, and how many in total, will Georgia's EV fleet require?

A As the number of EVs in Georgia grows, demand for chargers will also grow. Unlike gas stations, which all offer essentially the same service, EV chargers fall into several categories that each offer a unique service. Some, for example, are designed to quickly charge vehicles while users wait—a similar function to a gas station—while others charge more slowly and are meant to operate in a user's home overnight or at the workplace throughout the day. Each of these charger types plays an important role in serving an EV fleet.

A To estimate how many of each type of charger will be needed to serve Georgia's growing light-duty EV fleet, we used the model EVI-Pro Lite, designed by the U.S. Department of Energy. EVI-Pro Lite allows users to customize the model's forecast with a variety of

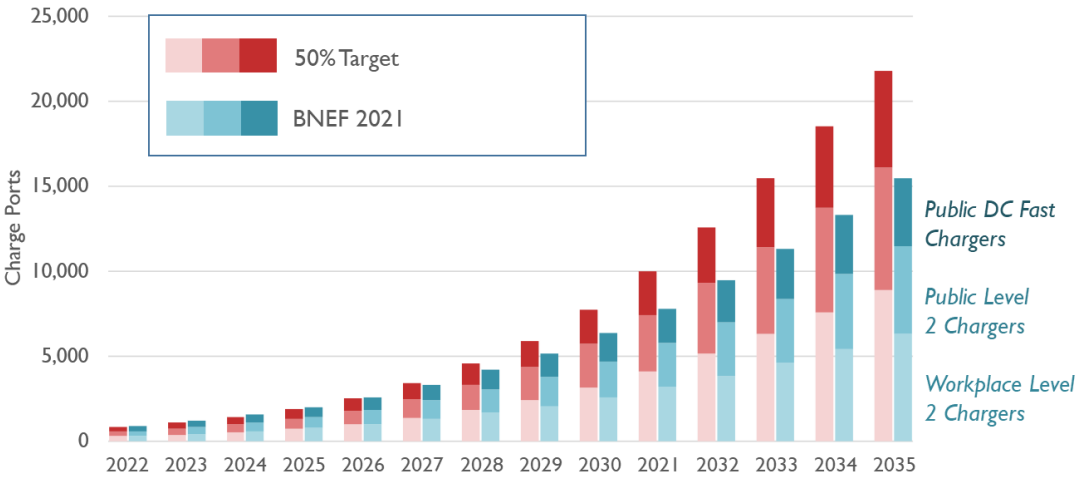
inputs, such as the total number of EVs.[20] It then estimates the number of chargers needed in three categories:[21]

- **DC fast chargers** – 50 kW to 350 kW chargers that allow for rapid charging during long journeys or for drivers without access to charging at home. 150 kW chargers can provide about 200 miles of range in 30 minutes.
- **Workplace Level 2 chargers** – Typically 6 kW to 19 kW chargers that can allow drivers to recharge their vehicles at work.
- **Public Level 2 chargers** - Typically 6 kW to 19 kW chargers that allow drivers to recharge their vehicles opportunistically throughout the day at various locations they drive to.

Within Georgia Power's service territory, the analysis indicates that the EV fleet under a BAU scenario will require an estimated 6,300 total EV chargers in 2030 and more than 15,000 in 2035.[22] Under a policy-based scenario in which 50 percent of vehicle sales are EVs in 2030, Georgia Power's service territory will require an estimated 7,700 EV chargers by 2030 and nearly 21,800 by 2035. Under both scenarios, about a quarter of chargers must be DC fast chargers. Today, the state of Georgia has 617 DC fast charger ports and 2,935 Level 2 charging ports.[23] Assuming approximately 51 percent of those chargers are in Georgia Power's service territory, today Georgia Power's service territory has roughly 1,812 chargers out of the 15,000-21,800 that might be needed by 2035.

[20] Other inputs include the percentage of drivers with access to home charging, EV range, and how many EVs are plug-in hybrid vehicles.
[21] California Energy Commission. 2021. *Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment.* Available at https://efiling.energy.ca.gov/getdocument.aspx?tn=238853.
[22] This number represents public Level 2 and DC fast chargers.
[23] U.S. Department of Energy. 2022. "Alternative Fueling Station Counts by State." *Alternative Fuels Data Center.* Available at https://afdc.energy.gov/stations/states.

Figure 3. Estimated Need for Charging Ports in Georgia Power's Territory



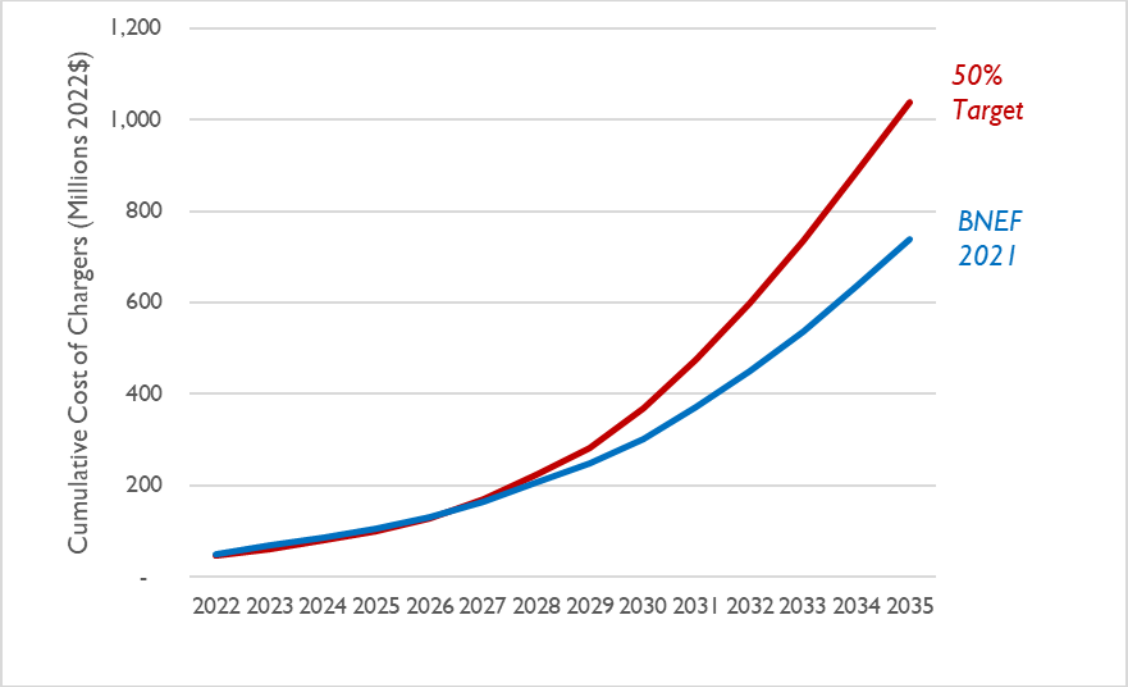
6. CHARGING INFRASTRUCTURE WILL REQUIRE INCREASING LEVELS OF INVESTMENT TO MEET CHARGING NEED

Q How much will it cost to construct and install sufficient chargers to meet the needs of Georgia's EV fleet?

A Using charger costs provided by the International Council on Clean Transportation,[24] I estimate that building the EV charging infrastructure necessary to sustain the share of Georgia's EV fleet owned by Georgia Power's customers will cost about $300 million in 2030 and about $740 million in 2035 under a BAU scenario. Under the policy-based scenario, the cost will reach $370 million by 2030 and over $1 billion by 2035, as shown in the figure below.

[24] Nicholas, M. 2019. *Estimating electric vehicle charging infrastructure costs across major U.S. metropolitan areas.* The International Council on Clean Transportation. Available at https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf.

Figure 4. Total Cost of Chargers Needed to Support EV Fleet of Georgia Power's Customers



As our results show, the charging infrastructure investments in both a BAU and a more rapid adoption trajectory are similar until 2026, at which point they begin to diverge. This result indicates that there is still time to plan, but that the planning runway is short before investment must begin in earnest to keep up with need.

Q How is this cost distributed between direct charger costs and "make ready" costs?

A The cost of EV charging infrastructure is typically broken into the cost of installing the charger hardware itself and "make-ready" costs associated with upgrading distribution systems and connections between the distribution system and the customer site. There is no universally agreed upon definition of make-ready, but it generally refers to all necessary electrical infrastructure between a utility grid interconnection and the charger, which can include a transformer, electric service panels, feeder, service drop and other components.[25] Make-ready is also highly site-specific, creating wide variance in the

[25] Nelder, C., E. Rogers. 2019. *Reducing EV Charging Infrastructure Costs.* RMI. Available at https://rmi.org/insight/reducing-ev-charging-infrastructure-costs/.

actual cost on the ground. Because of these elements, make-ready costs are generally understood to be between 30 and 60 percent of chargers' capital costs, though they can range higher.[26, 27]

Our results above account for both installation of hardware and make-ready costs by using conservative estimates from the International Council on Clean Transportation (Table 1). Overall, total charger investment estimates are most sensitive to the number of DC fast chargers deployed because DC fast chargers cost substantially more than Level 2 chargers.[28]

Table 1. Per-Charger Costs Used in Analysis

Charger Type	Networked Status	Cost (2022$)
Public Level 2	Networked	$13,872
Public Level 2	Non-networked	$9,446
Workplace Level 2	Networked	$11,248
Workplace Level 2	Non-networked	$7,659
DC Fast	Networked 150 kW	$111,058
DC Fast	Networked 350 kW	$192,525

Source: The International Council on Clean Transportation, adjusted to 2022$

[26] Nelder, C., E. Rogers. 2019. *Reducing EV Charging Infrastructure Costs.* RMI. Available at https://rmi.org/insight/reducing-ev-charging-infrastructure-costs/.

[27] Venkateshwara, V. 2020. *Utility Investments and Consumer Costs of Electric Vehicle Charging Infrastructure.* FTI Consulting for Energy Marketers of America. Available at https://www.energymarketersofamerica.org/ema_today/attachments/Energy_Marketers_of_America_Study-Utility_Infrastructure_for_EVs.pdf.

[28] In our estimate, DC fast-charger costs assume 3-5 chargers per site because in Georgia, there is a current average of 2.9 chargers per site and we expect an increasing number of chargers per site over time. We assume that Level 2 chargers are 38% non-networked, 62% networked in keeping with the assumptions used by the ICCT. We also assume that 50% of DC fast chargers are 150 kW, 50% are 350 kW. Our choice to use 50% 150 kW and 50% 350 kW DC fast chargers captures the range of make-ready costs seen in the literature, ensuring that our final costs are reasonable and conservative. See https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf.

Q What funding is expected to be available to support EV charger deployment in Georgia?

A Today, Georgia Power has a make-ready program available to help customers switch to EVs. The Commission authorized $6 million of investment annually from Georgia Power to support make ready infrastructure deployment such as wire and transformer upgrades.[29] The Company also offers rebates for EV charger installation, some limited ownership of public charging stations sited at customer locations (through the Community Charging Program), and education and awareness campaigns. The funding that has been authorized so far is an important first step for giving Georgia drivers the confidence they need to switch to an EV, but more planning and investment will be needed.

In addition to investments Georgia Power is making in EV charging infrastructure, more funding is becoming available as a result of the Bipartisan Infrastructure Law that was signed into law in late 2021. The law sets up two charging infrastructure funding programs with a total of $7.5 billion. The $5 billion National Electric Vehicle Infrastructure (NEVI) Formula Program will distribute funds to states to develop a national network of EV charging station corridors for long distance travel. Each state must submit an EV Infrastructure Deployment Plan by August 1, 2022, to receive funding.[30] Georgia's allocation for FY2022 is approximately $20 million, and over the course of the program, the total allocation will reach $135 million.[31, 32]

Assuming Georgia qualifies for funding, approximately 51 percent of the funding—$69 million—will go to Georgia Power's service territory. That means the

[29] Commercial Group, Georgia Industrial Group, The Kroger Co., Georgia Association of Manufacturers, Georgia Power Company, Metropolitan Atlanta Rapid Transit Authority. 2019. Settlement Agreement between Stipulating Parties. Docket No. 42516. Available at https://psc.ga.gov/search/facts-document/?documentId=179169.

[30] Federal Highway Administration. 2022. *National Electric Vehicle Infrastructure Formula Program.* Available at https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

[31] Federal Highway Administration. 2022. "President Biden, USDOT and USDOE Announce $5 Billion over Five Years for National EV Charging Network, Made Possible by Bipartisan Infrastructure Law." Available at https://highways.dot.gov/newsroom/president-biden-usdot-and-usdoe-announce-5-billion-over-five-years-national-ev-charging.

[32] Federal Highway Administration. 2022. "5-year National Electric Vehicle Infrastructure Funding by State." *Bipartisan Infrastructure Law: Electric Vehicles.* Available at https://www.fhwa.dot.gov/bipartisan-infrastructure-law/evs_5year_nevi_funding_by_state.cfm.

NEVI program can contribute about 23 percent of the $300 million in investment that will be needed in total through 2030 under a BAU future. On top of NEVI, $2.5 billion additional dollars will be available to states through a competitive grant process.[33]

Some private sources of funding will also be available to support charging infrastructure deployment in Georgia. Electrify America will be making a $1.2 billion investment across the U.S. (outside of California) over 10 years as a result of the Volkswagen diesel emissions settlement.[34]

These various funding sources will be important resources for Georgia as it builds out its network of EV charging stations. However, by 2030 and 2035, there will still be considerable additional funding needed from a variety of sources to support even BAU EV adoption in the state.

7. BENEFITS OF EV ADOPTION FOR GEORGIA RESIDENTS

Q Will EV adoption benefit the people of Georgia?

A Yes, but the magnitude of these benefits is partially dependent on the steps taken by Georgia Power to support and shape EV adoption and charging patterns. As the number of EVs in Georgia increases, Georgia ratepayers will experience a variety of benefits including avoided gasoline costs, other economic benefits, and potentially lower electricity rates if charging occurs in a manner that minimizes costs on the grid. The potential to achieve these benefits, coupled with the need to develop a statewide EV charging infrastructure plan, warrant a new docket specifically targeted at planning for EVs and maximizing their benefits.

Q How much will customers benefit from switching from gasoline to electricity?

A EV adoption leads to reductions in gasoline purchases and increases in electricity purchases. Because EVs use much less energy per mile traveled than gasoline vehicles, this switch can yield substantial cost savings. By combining our forecast of EV

[33] U.S. Department of Transportation. 2022. "Federal Funding Programs." Available at https://www.transportation.gov/rural/ev/toolkit/ev-infrastructure-funding-and-financing/federal-funding-programs.
[34] Electrify America. 2022. "Our Investment Plan." Available at https://www.electrifyamerica.com/our-plan/.

deployment with forecasts for gasoline prices, electricity prices, vehicle longevity, gasoline vehicle efficiency, EV efficiency, and vehicle miles traveled, we can calculate how much money drivers in Georgia will save when they switch from powering their vehicles with gasoline to electricity.

Under BAU EV adoption, savings from avoided gasoline spending in Georgia Power's service territory will reach $1.3 billion per year in 2035, and $6.9 billion cumulatively between 2022 and 2035, using the U.S. Energy Information Administration's projection of gas prices in the Annual Energy Outlook.[35] Under a policy-based 50 percent 2030 sales target, those savings reach an estimated $1.8 billion per year in 2035 and the cumulative savings increase to $8.9 billion. Electricity spending will increase, but on net, Georgia Power's ratepayers will still save between $1 billion and $1.5 billion per year in 2035 from switching to electric-powered cars.[36] Georgia Power's existing residential EV rate, which offers lower cost charging during off peak and super off peak hours, offers savings to EV drivers while also encouraging EV charging at times when it will create lower costs for the grid.

Further, shifting spending from out-of-state oil to in-state electricity generation, transmission, and distribution also has the benefit of strengthening Georgia's economy and reducing reliance on volatile imported energy supplies. Georgia produces no petroleum and contains no petroleum refineries, so every dollar saved on gas is another dollar that can be spent within the state's economy.[37]

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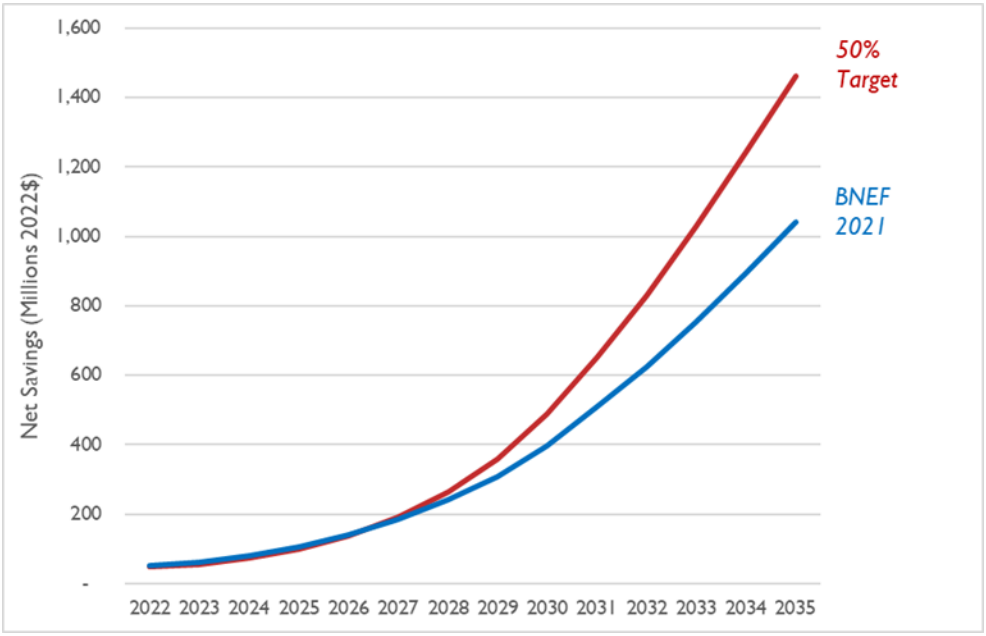
[35] U.S. Energy Information Administration. 2022. *Annual Energy Outlook 2022.* Available at https://www.eia.gov/outlooks/aeo/.

[36] Net savings due to switching from gas to electricity assume that electricity will cost $0.065 per kWh. This is the current price Georgia Power charges for off-peak EV charging, which it reports accounts for 62 percent of the charging time each year. Today, in 33 percent of the year—nearly all the time that is not off-peak—EV charging is "super off-peak" and even cheaper, at around $0.015 per kWh. This means that fuel-switching savings reported here should be treated as a conservative underestimate. See, https://www.georgiapower.com/residential/billing-and-rate-plans/pricing-and-rate-plans/plug-in-ev.html.

[37] U.S. Energy Information Administration. 2021. "Georgia: Profile Analysis." Available at https://www.eia.gov/state/analysis.php?sid=GA#:~:text=Georgia%20does%20not%20have%20any%20crude%20oil%20production%20or%20proved%20petroleum%20reserves.&text=None%20of%20the%20nearly%20200,the%2020th%20century%20were%20successful.&text=Georgia%20no%20longer%20has%20any%20petroleum%20refineries.

Figure 5. Estimated Annual Gasoline Cost Savings net of Incremental Electricity Costs Among EV Owners in Georgia Power's Service Territory



Q Will non-EV owners benefit as well?

A If EV customers are provided with meaningful price signals regarding the timing of their charging, there is the potential to provide benefits to all ratepayers by putting downward pressure on rates. If EV charging occurs primarily at times when the grid has available capacity to serve more load, it spreads the fixed costs of the grid across more electricity sales and reduces the per-kWh cost of electricity for all ratepayers. A Synapse study found that EV adoption led to greater incremental revenues for utilities than incremental costs on the system in California between 2012 and 2019. In Pacific Gas & Electric and Southern California Edison's service territories, we calculated a combined $806 million in net revenues associated with EV charging above the marginal costs imposed on the grid.[38] The additional revenues associated with new EV loads can help pay for fixed grid costs and reduce the burden on other ratepayers.

[38] Frost, J., M. Whited, and A. Allison. 2020. *Electric Vehicles are Driving Electric Rates Down*. Available at: https://www.synapse-energy.com/sites/default/files/EV_Impacts_June_2020_18-122.pdf.

A large portion of EV load (particularly at-home charging) can be flexible because vehicles tend to be parked for extended amounts of time. Managed charging and time-of-use electricity rates can encourage drivers to charge at times when low-cost energy and transmission and distribution capacity are available. Shifting EV load to these times can more efficiently use electric generation and transmission assets and can benefit all customers, including those without EVs.[39]

Q Are there any other potential benefits for the people of Georgia?

A Yes. Facilitating the transition to EVs can also keep Georgia's strong EV manufacturing momentum going. Numerous large EV and battery manufacturing facilities are being constructed and planned for Georgia, including Rivian's planned $5 billion electric truck plant in Morgan County and SK Innovation's $2.6 billion investment in two battery manufacturing plants in Commerce, Georgia, which is expected to bring at least 2,600 jobs to the area.[40, 41] According to the Southern Alliance for Clean Energy, Georgia leads the southeast in EV manufacturing employment, with more than 10,000 jobs as of December 2021.[42]

Q What actions do you recommend that the Commission take to help ensure that Georgians benefit from transportation electrification?

A Opening an EV-specific docket now, until EV planning can be directly incorporated into the IRP process, can help ensure that Georgia Power customers—and Georgians at large—realize the full benefits of EVs by coordinating EV charger deployment, informing the development of beneficial rate designs, and determining Georgia Power's role in the oncoming transition to EVs.

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[39] Frost, J., M. Whited, and A. Allison. 2020. *Electric Vehicles are Driving Electric Rates Down*. Available at: https://www.synapse-energy.com/sites/default/files/EV_Impacts_June_2020_18-122.pdf.

[40] WSBTV. 2021. "Gov. Kemp, Rivian announce $5 billion electric vehicle plant in Georgia." Available at https://www.wsbtv.com/news/local/gov-kemp-rivian-announce-5-billion-electric-vehicle-plant-georgia/NAWAXRYM2VBMBM52QLFRYCHLFQ/.

[41] Bluestein, G. 2021. "A green tech battery plant is transforming a deep-red part of Georgia." *The Atlanta Journal-Constitution*. Available at https://www.ajc.com/politics/a-green-tech-battery-plant-is-transforming-a-deep-red-part-of-georgia/YSDZBMNNSNHJLBIUYJS4IEYA5U/.

[42] Southern Alliance for Clean Energy. 2022. *Transportation Electrification in the Southeast*. Available at: https://cleanenergy.org/blog/year-end-data-shows-electric-transportation-is-full-speed-ahead-in-the-southeast/.

Q **Does this conclude your testimony?**

A Yes, it does.