

STATE OF GEORGIA

**BEFORE THE
GEORGIA PUBLIC SERVICE COMMISSION**

**In Re: Georgia Power Company's
2023 Integrated Resource Plan Update**

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Docket No. 55378

**DIRECT TESTIMONY OF GRAHAM TURK
ON BEHALF OF GEORGIA SOLAR ENERGY ASSOCIATION**

FEBRUARY 15, 2024

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Graham Turk. I am a researcher at the MIT Energy Initiative, a research consortium housed within Massachusetts Institute of Technology. My business address is 50 Ames St, Cambridge, MA 02142.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

I am submitting testimony on behalf of the Georgia Solar Energy Association (“GA Solar”).

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION?

A. No, I have not.

Q. HAVE YOU BEEN INVOLVED IN UTILITY REGULATORY PROCEEDINGS IN OTHER STATES?

A. Yes. While at Green Mountain Power, I prepared analysis and discovery responses for several contested Vermont Public Utility Commission dockets related to new tariff offerings (19-3167-TF, 19-3537-TF, and 19-3586-TF) as well as for the 2021 Integrated Resource Plan.

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I graduated from Princeton University with a Bachelor of Engineering in Computer Science in 2017. From 2017 to 2018, with the support of a Fulbright grant, I researched European energy markets at the Royal Institute of Technology in Stockholm, Sweden. From 2018 to 2022, I worked for Green Mountain Power (GMP), an investor-owned electric distribution utility based in Colchester, Vermont, in various roles.

At GMP, I began on the Innovation Team – as an innovation strategist I designed and administered customer programs in electric vehicles, battery storage, and demand flexibility. I then joined the Power Supply Team where I performed data analysis, including on the performance of capacity resources, marginal cost to serve new load types, and the potential value from bidding a portfolio of residential batteries into the New England wholesale energy market. I was the lead author of

1 GMP’s 2021 Integrated Resource Plan chapters on demand forecasting. I also prepared compliance
2 filings for Vermont’s renewable portfolio standard.

3 From 2021-2022, I was the Head of Customer Care at GMP, supervising a team of 30 customer
4 care representatives that served as the front line for all customer inquiries across all channels.

5 At the MIT Energy Initiative, my research focuses on understanding the impacts on electric
6 distribution grids of distributed energy resources (primarily heat pumps, batteries, and electric
7 vehicles). I also investigate retail rate design to complement resource adequacy planning.

8 **Q. PLEASE SUMMARIZE THE PURPOSE OF YOUR TESTIMONY AND HOW IT IS**
9 **ORGANIZED.**

10 A. The purpose of this testimony is to propose a new residential “bring your own device” (BYOD)
11 tariff to help meet the capacity constraints of Georgia Power Company (“the Company”) in the
12 immediate future and provide information to the Commission about similarly-designed BYOD
13 programs available in other states.

14 These recommendations are based on my direct experience at GMP managing a BYOD tariff and
15 knowledge of similar offerings by other US utilities. My testimony is organized into the following
16 sections:

- 17 ● Section II describes GMP’s “Bring Your Own Device” (BYOD) tariff, including program
18 details, regulatory history, and key outcomes. I also outline details from other BYOD-style
19 programs by other US utilities.
- 20 ● Section III argues why the Company should be required to offer a new residential BYOD
21 tariff, consistent with least cost planning principles, to meet future resource adequacy
22 challenges posed by expected load growth, based on my analysis of the Company’s 2023
23 Integrated Resource Plan.
- 24 ● Section IV contains my proposal for such a BYOD tariff.
- 25 ● Section V contains my concluding remarks.

26 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS TO THE COMMISSION.**

27 A. I recommend that the Commission direct the Company to file within 6 months after the final
28 order in this docket a new tariff for a residential BYOD program with the following features:

- 1 ● A hybrid compensation structure with both upfront and ongoing compensation based on
2 actual system performance, with the level of ongoing compensation locked in for a term of
3 at least 5 years. The exact level of compensation should be determined jointly by the
4 Company and the Commission using a similar methodology as the DCO-1 tariff, which
5 allocates 75% of the projected program value to participating customers.
- 6 ● A maximum of 60 events per year, with a maximum duration of 3 hours per event
- 7 ● The use of the battery's inverter for the purpose of verifying performance, as opposed to
8 relying on the installation of a secondary utility meter.
- 9 ● Eligibility for multiple battery manufacturers, with a pathway for new manufacturers to
10 become eligible.
- 11 ● Consumer protections, including a standard disclosure form, mandatory installer training,
12 advance event notifications, and the ability to opt out of events (which will impact the
13 ongoing compensation payment).
- 14 ● The ability for participants in the BYOD tariff to participate in other utility programs.

15 A BYOD tariff would complement other resources requested in the Company's 2023 IRP while
16 allowing the Company to gain expertise in managing aggregations of customer-sited resources,
17 which can be leveraged in future IRPs to meet near term capacity deficits similar to what the
18 Company is currently projecting for Winter 2025/2026.

19

20 **II. DETAILS ON GMP'S BRING YOUR OWN DEVICE TARIFF AND OTHER**
21 **RELATED OFFERINGS AROUND THE U.S.**

22 **Q. HOW DO YOU DEFINE A VIRTUAL POWER PLANT?**

23 A. A virtual power plant (VPP) is an aggregation of Internet-connected distributed energy
24 resources (DERs) that can be dispatched collectively to provide grid services, for example
25 reducing system-wide peak demand or performing frequency regulation. Dispatch is typically
26 performed directly by a utility or by a third-party aggregator. While VPPs can include many device
27 types (e.g., electric vehicle charging stations, smart thermostats, smart water heaters), in this
28 testimony my use of the term "VPP" refers specifically to aggregations of residential battery
29 energy storage systems unless otherwise specified.

1 **Q. DO YOU CONSIDER VPPS TO BE A FIRM CAPACITY RESOURCE?**

2 A. Yes. VPPs are instantly dispatchable and have successfully demonstrated their reliability in
3 both wholesale capacity markets and utility-managed demand flexibility programs. By aggregating
4 many individual systems, the risk of non-performance can be lower than large resources with
5 single points of failure. Unlike traditional demand response programs, a VPP does not rely on
6 changes in customer behavior. This treatment of VPPs is corroborated by a recent Brattle Group
7 report, which found that VPPs “could perform as reliability as conventional resources and
8 contribute to resource adequacy at a similar scale.”¹ Furthermore, VPPs enable consumers to play
9 a more active role in helping to meet grid reliability challenges.

10 **Q. PLEASE PROVIDE AN OVERVIEW OF GMP’S SERVICE TERRITORY AND**
11 **VERMONT’S REGULATORY STRUCTURE AS CONTEXT FOR SUBSEQUENT**
12 **RESPONSES.**

13 A. GMP is the largest electric distribution utility in Vermont, serving 265,000 homes and
14 businesses. Its service territory is predominantly rural, and residential customers account for the
15 majority of total load served. Vermont is the only state in New England where electric distribution
16 utilities remain vertically integrated. GMP owns generation, sub-transmission, and distribution
17 infrastructure. It is the exclusive load-serving entity in its service territory (i.e., there is no retail
18 choice). The transmission system in Vermont is owned and operated by a separate entity, VELCO,
19 which is jointly owned by the Vermont electric distribution utilities. The state’s peak load is
20 approximately 1000 MW.

21 **Q. PLEASE DESCRIBE, AT A HIGH LEVEL, GMP’S CURRENT BYOD OFFERING.**

22 A. In GMP’s “Bring Your Own Device” (BYOD) tariff,² customers receive an upfront
23 compensation payment in exchange for allowing GMP to remotely discharge their energy storage
24 system for the purpose of peak demand reduction over a 10-year period. The term, “bring your
25 own device” (not to be confused with workplace policies on personal laptop usage) refers to
26 customers’ voluntary enrollment of battery systems that they own. GMP is allowed to discharge

¹ https://www.brattle.com/wp-content/uploads/2023/04/Real-Reliability-The-Value-of-Virtual-Power_5.3.2023.pdf

² <https://greenmountainpower.com/rebates-programs/home-energy-storage/bring-your-own-device/>

1 systems for a maximum of 8 times per month (though in practice the number of events per month
2 averaged 5 during my time administering the program). All residential customers are eligible for
3 participation; batteries are installed behind the customer’s utility meter.

4 **Q. HOW LONG HAS THE PROGRAM BEEN ACTIVE AND WHAT WAS THE**
5 **PROCEDURAL HISTORY?**

6 The tariff was approved in September 2019 (Docket 19-3537-TF) following a 9-month
7 investigation by the Vermont Public Utility Commission (VPUC). The VPUC found the tariff to
8 meet the just and reasonable standard. The tariff filing was made after an 18-month pilot with
9 similar features. GMP has approval in its Multi-Year Regulation Plan (MYRP) to conduct limited-
10 time innovative pilots “beyond the sale of basic electric service...that advance the goals of
11 Vermont’s state energy policy.”³ Innovative pilots have led to several tariffed programs, including
12 BYOD, two residential electric vehicle (EV) charging tariffs, and a public EV fast charging rate.
13 BYOD enrollment was initially capped at 5 MW per calendar year, but the cap was lifted in August
14 2023 (VPUC Docket 23-1335).

15 **Q. WHAT WAS YOUR ROLE IN PROPOSING AND THEN ADMINISTERING GMP’S**
16 **BYOD TARIFF?**

17 Together with one other colleague, I created the program’s financial model, drafted and edited
18 tariff filing letters and customer agreements, responded to discovery requests, and worked closely
19 with third party battery manufacturers and installers to ensure system compatibility. Once the tariff
20 was approved, I oversaw day-to-day program management, including approving new program
21 applicants, scheduling peak events in our distributed energy resource management system
22 (DERMS), tracking actual performance during called events, and creating regulatory reports that
23 were submitted to the VPUC as part of our annual Multi-Year Regulation Plan (MYRP)
24 compliance filing. These reports included enrollment figures, the number of systems that failed to
25 respond to discharge signals, and actual realized financial benefits compared to projected benefits
26 at the time of tariff filing.

³ <https://greenmountainpower.com/wp-content/uploads/2024/01/Final-2023-Regulation-Plan-as-amended-March-30-2023.pdf>

1 **Q. HOW MUCH ARE CUSTOMERS COMPENSATED IN EXCHANGE FOR**
2 **ENROLLING THEIR ENERGY STORAGE SYSTEMS IN THE BYOD TARIFF?**

3 A. Participating customers receive an up-front compensation payment of \$850 per enrolled kW for
4 a 3-hour resource or \$950 per enrolled kW for a 4-hour resource, up to a maximum of 10 kW (the
5 distinction between 3- and 4-hour resources is explained later in this testimony). Customers can
6 elect to enroll the entire capacity of their system (the total kWh energy capacity divided by either
7 3 or 4 hours), or a portion of the capacity. GMP provides an additional \$100 per enrolled kW for
8 systems installed within sections of GMP's service territory that experience distribution delivery
9 constraints.

10 **Q. WHAT IS THE VALUE PROPOSITION TO PARTICIPATING CUSTOMERS IN THE**
11 **BYOD PROGRAM?**

12 A. By installing residential storage, customers receive the benefit of a resilient resource to protect
13 against unexpected outages. Unlike conventional backup generators, during times when the battery
14 is not being used to provide backup power, it can be dispatched to reduce peak demand for the
15 benefit of all customers.

16 **Q. HOW WAS CUSTOMER COMPENSATION CALCULATED IN THE BYOD TARIFF?**

17 A. Customer compensation was calculated first by performing a forecast of transmission and
18 capacity prices in New England. While GMP is a vertically integrated utility, system operation
19 falls within the purview of a regional transmission organization: ISO New England (ISO-NE). As
20 a load-serving entity within ISO-NE, GMP is allocated a portion of regional transmission and
21 capacity costs based on its coincident demand during the maximum statewide demand hour in each
22 calendar month (for transmission) and its coincident demand during the maximum region-wide
23 demand hour across the full year (for capacity). ISO-NE provides its own forecast of transmission
24 and capacity prices 10 years into the future. Starting with these forecasts, we built a cost-benefit
25 model to estimate the net present value of a battery resource dispatched to reduce coincident peak
26 demand (both monthly and annual) over a 10-year period. We used historical performance from
27 the BYOD pilot to adjust nameplate capacity values; this included forecast accuracy (how often
28 we correctly predicted monthly and annual peaks), battery availability (the percentage of systems
29 available for dispatch at any given time), and the optimal peak load reduction assuming perfect

1 foresight (e.g., for each 1 MW of nameplate capacity, by how much can we expect to reduce peak
2 demand?)

3 We also adjusted up for line losses and the capacity reserve margin since all BYOD resources are
4 interconnected at the distribution level and reduce GMP's net demand. We chose a 10-year
5 duration for the cost-benefit analysis because at the time, that was often listed as the minimum
6 expected battery lifetime in manufacturers' warranties. 70% of the expected net present value is
7 allocated to participating customers in the form of the upfront credit, while 30% is reserved for
8 non-participating billpayers. This methodology closely mirrors that proposed by the Company in
9 its proposed DCO-1 tariff: "The participating customer's credit will be calculated as 75% of the
10 projected system value of the DER asset paid over the contract period."

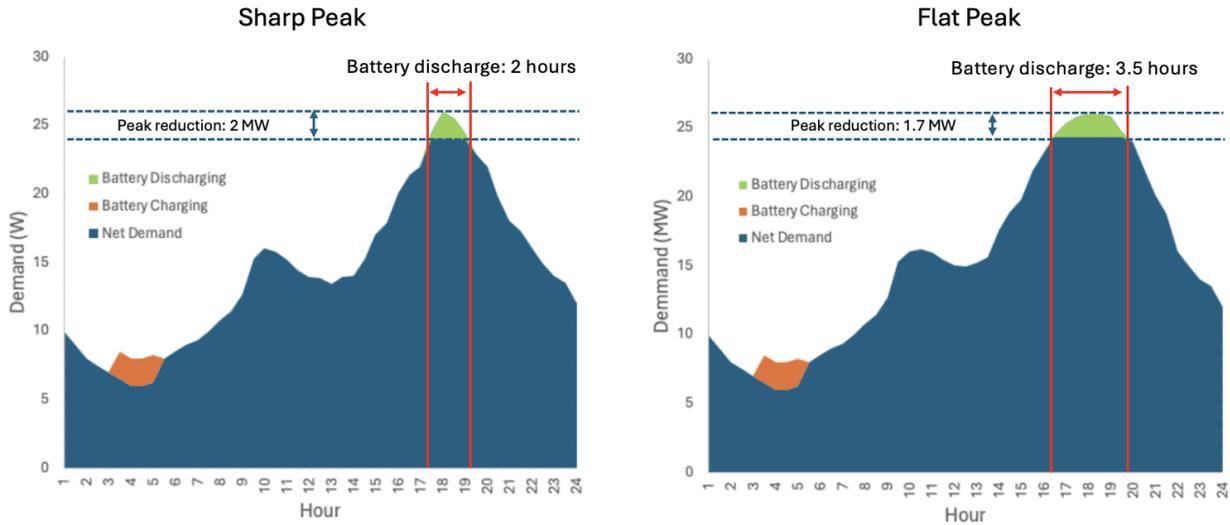
11 **Q. WHY DID GMP CHOOSE NOT TO ALLOCATE THE FULL VALUE OF PEAK**
12 **REDUCTION TO PARTICIPATING CUSTOMERS?**

13 A. Whenever proposing a new tariff, we believed it was important to allocate a portion of the
14 program's expected value to apply downward rate pressure for all billpayers. For GMP's BYOD
15 tariff specifically, we set participant compensation levels below our calculated value of peak
16 reduction to ensure net benefits for both participants and non-participants. This was also a way to
17 de-risk any expenditures. The 30% non-participant share acted as a hedge against imperfect
18 projections. If instead the full net present value of battery dispatch were allocated to participants,
19 then any shortfall in program performance would mean that the program applied upward rate
20 pressure.

21 **Q. WHY ARE THERE DISTINCT COMPENSATION AMOUNTS FOR 3- AND 4-HOUR**
22 **STORAGE RESOURCES?**

23 The two categories reflect the difference in expected reduction in peak demand as a percentage of
24 the energy storage system's nameplate capacity. Figure 1 illustrates this concept via a simple
25 example featuring a 2 MW/4 MWh battery and two different system load profiles during a 24-hour
26 period. In both cases, the battery charges during overnight hours when system load is low. In the
27 left panel, where the peak is sharper, 2 MW battery can be discharged over 2 hours to achieve 2
28 MW of peak load reduction (100% of nameplate capacity). In the right panel, a flatter peak means
29 that the battery must be dispatched over a period of 3.5 hours to achieve the optimal peak load

1 reduction of 1.7 MW (85% of nameplate capacity). When the BYOD tariff was originally filed,
2 we expected there would be more diversity in battery chemistries and nameplate power-to-energy
3 ratios that would make some systems better suited to enroll as 4-hour resources. In my time
4 administering the program, the vast majority of customers elected to enroll 3-hour resources.



5 Figure 1: Illustration of optimal battery dispatch for different load profiles.

5

6 **Q. WHAT WAS THE BASIS FOR THE \$100 PER KW ADDITIONAL COMPENSATION**
7 **PAYMENT?**

8 GMP’s service territory has many distribution feeders that are congested due to distributed
9 generation (primarily rooftop photovoltaic systems).⁴ Batteries can help alleviate these congestion
10 conditions by charging during solar hours and reducing the amount of energy backfed through a
11 distribution substation to the transmission grid. \$100/kW reflects a portion of avoided cost of
12 future distribution investments.

13 **Q. WHAT HAPPENS IF CUSTOMERS’ ENERGY STORAGE SYSTEMS FAIL TO**
14 **RESPOND TO CALLED EVENTS?**

15 A. If an energy storage system enrolled in BYOD experiences a communication failure and the
16 issue is not remedied within 30 days after notification by GMP, participating customers are
17 charged \$12.70 per enrolled kW per month until communication is restored. A BYOD battery that

⁴ <https://www.arcgis.com/apps/webappviewer/index.html?id=4eae2b58c4c4820b24c408a95ee8956>

1 fails to perform within +/- 10% of its enrolled capacity is charged \$12.70 per deficient kW. For
2 example, a three-hour resource that enrolled at 8 kW but delivers 5 kW on average during the
3 month's called events will be charged a penalty of $\$12.70 * (8 \text{ kW} - 5 \text{ kW}) = \38.10 for that
4 month. These provisions were included to protect non-participating billpayers and ensure that the
5 program delivers the expected value and the associated downward rate pressure.

6 **Q. ARE BATTERIES IN THE BYOD PROGRAM ALLOWED TO EXPORT TO THE**
7 **GRID AND HOW ARE CUSTOMERS COMPENSATED FOR THAT EXPORTED**
8 **ENERGY?**

9 A. Yes. All batteries in the program are allowed to export to the grid. Any energy exported by the
10 batteries to the grid is credited at the full retail electricity rate. In practice, peak events tended to
11 coincide with periods when prices in ISO-NE's real-time electricity market were higher than
12 average. On the other hand, battery charging tended to occur during midday or overnight hours,
13 when wholesale prices were lower than average. This "arbitrage" (charging the battery during low-
14 price hours and discharging during high-priced hours) was not quantified or included in customer
15 compensation.

16 **Q. IS PERFORMANCE DETERMINED BY THE CUSTOMER'S NET DEMAND OR THE**
17 **BATTERY'S OUTPUT?**

18 A. Performance is calculated based on the battery inverter's metered output during called peak
19 events. While the battery is physically installed behind the customer's meter and discharging
20 appears as negative load from a system balancing perspective, it is treated as a supply-side resource
21 for peak demand resource adequacy. The customer's appliance load, lighting, and HVAC-related
22 demands are unaffected by the battery's activity.

23 **Q. IN CASES WHERE BATTERY INSTALLATIONS REQUIRED UPGRADES (E.G.,**
24 **REPLACEMENT OF A DISTRIBUTION TRANSFORMER), HOW ARE THOSE COSTS**
25 **ADDRESSED?**

26 A. GMP does not use a special procedure for the treatment of upgrades related to BYOD
27 enrollment. These are treated the same as any other customer-triggered upgrades.

1 **Q. WHY NOT SIMPLY ALLOW CUSTOMERS WITH BATTERIES TO ENROLL ON**
2 **EXISTING TIME-OF-USE RATES? WHY WAS THE BYOD TARIFF NECESSARY?**

3 A. Time-of-use rates are typically designed with simplicity in mind so that customers can make
4 small behavioral changes to reduce their electricity costs. In a two-part time-of-use rate, the on-
5 and off- peak prices are typically averages of the cost to provide kilowatt-hours during each period
6 over a full season or year. These prices are not accurate proxies for the instantaneous marginal cost
7 of generating and delivering electricity. On a purely volumetric time of use rate, batteries would
8 only be incentivized to charge during off-peak hours and discharge during on-peak hours, with no
9 differentiation within those blocks or across days. This may provide value to participants but offers
10 no benefit for resource adequacy, which is shared among all billpayers. Rather than publish a rate
11 that makes it so that every battery owner solves their own optimization problem with no value to
12 other billpayers, the BYOD tariff allows GMP to incorporate batteries into a centralized
13 optimization problem, dispatching them at times that achieve the maximum value for all
14 customers.

15 **Q. WHAT CONSUMER PROTECTION MEASURES ARE USED FOR BYOD**
16 **PARTICIPANTS?**

17 A. GMP works closely with participating installers to ensure that they have been trained on
18 program details and can communicate those details to their customers. While customers have the
19 ability to enroll their maximum battery capacity, GMP recommends that customers concerned
20 about battery availability for backup power should consider reserving a portion of their battery
21 (e.g. 20%) that GMP cannot access during peak events. During my time overseeing day-to-day
22 program operation, we made an attempt not to dispatch battery resources if weather-related outages
23 were expected, since customers enrolled in the program had purchased their batteries for resilience
24 purposes. Customers are always notified of peak events 24 hours in advance.

25 **Q. WERE YOU AWARE OF ANY INSTANCES WHERE GMP DISPATCHED BYOD**
26 **RESOURCES AND A CUSTOMER EXPERIENCED AN OUTAGE AS A RESULT OF**
27 **NOT HAVING SUFFICIENT ENERGY REMAINING IN THE BATTERY?**

1 A. In over 3 years of program operation, I am aware of one instance where this occurred, which
2 was due to a car-pole accident immediately after the peak event ended. The outage was restored
3 within two hours.

4 **Q. CAN CUSTOMERS TERMINATE THEIR PARTICIPATION IN THE BYOD**
5 **TARIFF?**

6 A. Yes. If for whatever reason a participating customer wishes not to participate in called BYOD
7 events, they can exit the program by providing 30 days' written notice of termination. Customers
8 who terminate participation are responsible for making a one-time payment to GMP that reflects
9 the pro-rated value of the compensation amount they received proportional to the number of
10 months remaining in the initial term (10 years).

11 **Q. HOW HAVE BYOD SYSTEMS PERFORMED SINCE THE TARIFF WAS**
12 **APPROVED?**

13 A. As of the summer of 2022 (when I left GMP), the program had performed in line with
14 expectations. The majority of participating systems responded to all called peak events at their full
15 enrolled capacity. There was a small number of systems that consistently failed to perform at their
16 enrolled level during winter months. After investigating the issue, we determined that the cause
17 was customers had been told by installers to only allow their systems to charge from on-site solar
18 energy so they would remain eligible for the federal investment tax credit (ITC). At the time, only
19 energy storage systems that were charged exclusively by solar could receive the ITC. This is no
20 longer the case. Under the Federal "Inflation Reduction Act" (IRA), all residential energy storage
21 systems over 3 kWh are eligible for the ITC as of 2023, regardless of how they are charged. Had
22 this provision been in place earlier, I do not believe those delinquent systems would have
23 performed poorly.

24 **Q. WHICH BATTERY STORAGE SYSTEMS ARE ELIGIBLE TO PARTICIPATE IN**
25 **THE BYOD TARIFF?**

26 A. Currently, there are 6 eligible storage system brands that can participate in the BYOD tariff:
27 Emporia, Enphase, FranklinWh, Generac, SolarEdge, and Tesla.

1 **Q. IS THERE ANY WAY FOR NEW BATTERY STORAGE SYSTEMS TO BECOME**
2 **ELIGIBLE TO PARTICIPATE IN THE BYOD TARIFF?**

3 A. Yes. To become eligible for participation in the BYOD tariff, an energy storage system
4 manufacturer must integrate its control system with GMP's DERMS platform so that GMP can
5 remotely discharge the battery during peak events. An amendment to the list of systems eligible
6 for participation can be done without a full tariff amendment.

7 **Q. DID GMP INCLUDE THE VALUE OF THE UPFRONT BYOD COMPENSATION**
8 **PAYMENT IN ITS RATE BASE?**

9 No. The upfront compensation payment was booked as a direct power supply operating expense
10 and not subject to regulated rate of return.

11 **Q. ARE YOU AWARE OF ANY OTHER PROGRAMS IN THE US SIMILAR TO GMP'S**
12 **BYOD?**

13 A. Yes. Hawaiian Electric Company (HECO) offers a Bring Your Own Device tariff that was
14 modeled on GMP's tariff after extensive discussion with their innovation team. Up until March 1,
15 2024, participating customers received an upfront credit of \$850 per committed kW plus an
16 ongoing credit of \$5 per committed kW per month in exchange for allowing HECO to discharge
17 the battery for a pre-specified 2-hour period in the evening. HECO recently updated the tariff to
18 allow for more flexibility in event participation.⁵

19 In Massachusetts' Connected Solutions program, participants receive \$275 per kilowatt per year
20 for a battery's average contribution during summer peak events. Each event lasts a maximum of 3
21 hours, and there can be no more than 60 called events per summer.⁶ As of the end of 2020, the
22 program had enrolled 310 MW of capacity across 34,000 participants.⁷

23 In March 2023, the North Carolina Utilities Commission (NCUC) ordered Duke Energy in North
24 Carolina to work with stakeholders to develop an energy storage pilot program for Commission

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https://www.hawaiianelectric.com/documents/products_and_services/customer_renewable_programs/sre_byod_flyer.pdf

⁶ <https://www.masssave.com/residential/rebates-and-incentives/battery-storage-and-evs/batteries>

⁷ <https://www.cleanelectric.org/wp-content/uploads/ConnectedSolutions-An-Assessment-for-Massachusetts.pdf>

1 approval.⁸ The NCUC approved Duke’s proposed “PowerPair” program in January 2024, which
2 provides an upfront solar payment of \$360 per kW, up to 10 kW, and an upfront storage payment
3 of \$400 per kWh up to 13.5 kWh, for a maximum upfront compensation payment of \$9,000 for a
4 solar paired storage system.⁹ In addition to these upfront compensation payments, participants are
5 placed into one of two cohorts. In Cohort A, participants are enrolled on a time-of-use retail rate
6 and have full control of their battery. In Cohort B, participants are enrolled in a VPP with Duke
7 Energy having direct control over the battery during peak events up to 27 times per year.
8 Participants in Cohort B will receive an additional performance-based compensation payment of
9 \$6.50/kW-month. Duke is scheduled to begin accepting applications in May.

10 In California, Pacific Gas & Electric launched a BYOD-style program in partnership with Tesla.¹⁰
11 Participating Powerwall owners receive \$2 per kWh delivered during events called by PG&E that
12 align with periods in which the California independent system operator (CAISO) declares an alert
13 or emergency. Participants can set their backup reserve to ensure that their full battery is not
14 depleted during an event. In practice, a per-kWh compensation payment is similar to a per-kW
15 compensation payment that uses the average dispatch across all events. The key difference is that
16 the value to participants of a per-kWh compensation payment depends strongly on the number of
17 events called.

18

19

III. JUSTIFICATION FOR RESIDENTIAL BYOD TARIFF

20

**Q. GEORGIA POWER HAS ALREADY PROPOSED THREE CUSTOMER-SITED DER
21 TARIFFS AND ARE PROPOSING TO BUILD MULTIPLE UTILITY SCALE BATTERY
22 PROJECTS. WHY DO YOU BELIEVE THE COMMISSION SHOULD ORDER THE
23 COMPANY TO FILE A RESIDENTIAL BYOD TARIFF?**

24

A. There are six core reasons a residential BYOD program should be included in Georgia Power’s
25 IRP, which I will expand on in subsequent responses.

⁸ <https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=36643204-d163-45fd-a960-255eba5b10b9>

⁹ <https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=9af65653-9428-41c7-b99e-935ae26967c8>

¹⁰ <https://www.tesla.com/support/energy/virtual-power-plant/pge>

1 1. **Speed and flexibility of deployment:** VPPs are composed of many small-scale
2 distributed resources, each of which can be installed and commissioned in a matter of days,
3 not months or years. VPPs can also be scaled easily to match evolving capacity needs.

4 2. **Private capital:** by aggregating customer-owned resources, a BYOD tariff would
5 leverage private capital for the benefit of all billpayers.

6 3. **Resource diversity:** a residential BYOD tariff helps diversify the pool of resources used
7 to meet resource adequacy.

8 4. **Resilience:** residential batteries provide the direct benefit of resilience in the case of grid
9 outages.

10 5. **Distribution constraints:** unlike transmission-interconnected capacity resources, a
11 residential BYOD program can address both bulk system issues *and* local distribution
12 constraints, even when the two types of issues are not coincident.

13 6. **Operational Experience:** launching a BYOD tariff will provide the Company with
14 experience managing fleets of customer-sited resources, which will be invaluable for future
15 planning to meet capacity needs due to expected electrification of residential heating and
16 vehicles.

17 **Q. PLEASE EXPAND ON THE FIRST REASON RELATED TO THE SPEED AND**
18 **FLEXIBILITY OF DEPLOYMENT.**

19 A. The Company testified that the new BESS projects proposed in the 2023 IRP are projected to
20 be online by the winter of 2026/2027. In that same winter season, the Company is projecting a
21 capacity need of 1875 MW (IRP Main Document, p. 11). If any of the proposed projects are
22 delayed for any reason and actual demand remains aligned with forecasts, the Company will face
23 a significant capacity shortfall in the winter of 2026/2027.

24 As the Company stated in its direct testimony, “there is limited time available to procure or
25 construct the resources needed to meet customers’ capacity needs.” Residential BYOD programs
26 can be spun up at a speed that matches this urgency. As one example, Ontario’s independent system

1 operator recently launched a residential VPP with over 90 MW of capacity in just 6 months.¹¹
2 While Ontario’s program relied primarily on smart thermostats, it is illustrative of the potential of
3 VPPs to meet urgent capacity needs. Similarly, Sunrun and PG&E launched a residential battery
4 pilot in 2023 to meet summer peak demand related to air conditioning load. The program launched
5 just 6 months after it was approved by the California Public Utilities Commission.¹² Residential
6 BYOD programs can also be deployed without the need for transmission infrastructure or
7 extensive interconnection studies.

8 Furthermore, compared to other resources whose capacity must be determined during the design
9 and engineering phase, an aggregation of many small-scale battery systems can expand over time
10 to meet additional demand growth simply by enrolling new systems. This ability to “right size”
11 the BYOD program based on evolving demand forecasts reduces the risk of over procurement in
12 cases where some portion of new load included in the Company’s demand forecast fails to materialize. This
13 in turn would reduce the risk that billpayers shoulder the cost of capacity resources that are not
14 ultimately required for resource adequacy.

15 According to oral testimony by Francisco Valle during the Direct Hearing on 1/16/24, among large
16 anticipated industrial loads included in their forecast, only 14 out of 52 are actually committed.
17 Without historical precedence for this recent level of investment in energy-intensive
18 manufacturing and data center loads (shown in Figure 1 of the Company’s Direct Testimony), it
19 is unclear how the Company calculated the probability distributions used to adjust upward the load
20 and energy forecasts.

21 For any new confirmed projects, load will not materialize instantly. Those projects will need to go
22 through permitting, design, engineering, and construction. While typically these timelines are
23 shorter than utility procurement cycles, a BYOD program would allow capacity needs to match
24 new loads as they materialize rather than preemptively making capital investments based on
25 models that have not been validated against actual data.

¹¹ <https://www.utilitydive.com/news/ontario-vpp-virtual-power-plant-energyhub/706496/>

¹² <https://investors.sunrun.com/news-events/press-releases/detail/279/sunrun-and-pge-collaborate-on-residential-battery-powered>

1 **Q. PLEASE EXPAND ON THE SECOND REASON RELATED TO PRIVATE CAPITAL.**

2 A. A BYOD tariff would enable the Company to procure the benefit of fast-acting battery storage
3 for all customers' benefit without increasing the rate base. Often the only required capital
4 investment is the software used to control individual batteries enrolled in the program. The
5 Commission could compare the costs for the new BESS, PPA, or CT projects (inclusive of
6 regulated rate of return) to the cost of procuring peaking capacity from a BYOD tariff via the
7 compensation structure proposed below. Furthermore, by providing peaking capacity
8 interconnected at the distribution grid adjacent to load, residential batteries avoid the line losses
9 associated with transmission-interconnected capacity resources.

10 **Q. PLEASE EXPAND ON THE THIRD REASON RELATED TO RESOURCE**
11 **DIVERSITY.**

12 In its Direct Testimony, the Company states, “[T]o preserve system reliability and resilience for
13 all customers during all hours, the Company needs a diverse portfolio of dispatchable resources.”
14 The importance of resource diversity is well established in utility planning. In addition to diversity
15 in technology type, it is important to have diversity of deployment context. Large-scale resources
16 benefit from economies of scale by using a single point of common coupling with the distribution
17 or transmission grid. Yet this also represents a single point of failure. On the other hand, individual
18 systems contained within a BYOD program can fail without materially impacting the aggregate
19 capacity. Similar to risk pools in the insurance industry, a BYOD program spreads the risk of non-
20 performance over thousands of individual assets.

21 **Q. PLEASE EXPAND ON THE FOURTH REASON RELATED TO RESILIENCE.**

22 A. Similar to the DCO-1 and DCL-1 tariffs, which are only open to commercial and industrial
23 customers, a BYOD tariff would expand resilience options for residential customers by defraying
24 the total cost of ownership of battery storage (through the upfront and ongoing compensation
25 payments). For homes with existing solar PV, the addition of a battery transforms the solar into a
26 resilient resource by allowing the solar to charge the battery during grid outages.

27 As more consumers purchase electric cars – supported in part by historic investments in
28 manufacturing in Georgia –having uninterrupted power will mean not only keeping on the lights

1 and running the heat but also getting to work, picking up food and essentials, and driving kids to
2 school. At GMP, we treated the BYOD tariff as an extension of our responsibility to provide
3 reliable service to Vermonters, regardless of whether power was delivered via our distribution
4 infrastructure or via a residential battery that a customer was able to install because of our cost-
5 based compensation payments.

6 While we did not do so for GMP's BYOD tariff, in calculating the value of a BYOD program the
7 Company could even include avoided interruption costs, for example using the Interruption Cost
8 Estimator tool as developed by Lawrence Berkeley National Laboratory.¹³

9 **Q. PLEASE EXPAND ON THE FIFTH REASON RELATED TO DISTRIBUTION**
10 **CONSTRAINTS.**

11 A. While the Company's 2023 IRP deals primarily with bulk system capacity needs, other utilities
12 in the US are projecting constraints on their distribution systems, particularly at the substation
13 level, due to electrification of residential heating and passenger vehicles.¹⁴

14 Residential batteries can help alleviate these distribution constraints in addition to meeting system-
15 wide peak demand. Transmission-connected resources can only address the latter. Whereas all
16 batteries within a residential BYOD program *can* receive the same dispatch signal, this is not
17 required. The Company could send a signal for only those batteries on specific congested
18 residential distribution feeder to discharge at a specific time (as long as these hours are not
19 coincident with system-wide peaks) or send a signal for batteries to charge when solar generation
20 is abundant to help avoid curtailment (the company forecasts adding over 10,000 MW of solar in
21 its MG0 capacity expansion model). This practice of targeted local peak reduction through the
22 dispatch of small cohorts within a larger BYOD program could be used to defer distribution
23 investments, delivering savings to all Georgia Power billpayers. Similar to GMP's BYOD
24 program, the Company could offer an additional performance-based compensation payment for
25 battery systems installed in congested areas of the distribution grid in exchange for the ability to
26 dispatch more frequently than the base offering.

¹³ <https://icecalculator.com/home>

¹⁴ <https://www.mass.gov/doc/gmacesmp-drafteversource/download>

1 **Q. PLEASE EXPAND ON THE SIXTH REASON RELATED TO OPERATIONAL**
2 **EXPERIENCE.**

3 A. While much has been written about how utilities can operate VPPs to reduce costs for their
4 customers,^{15,16} there is no substitute for direct experience. It takes time for utilities to fine-tune
5 enrollment, billing, and day-to-day program operation. At GMP, we had the benefit of “learning
6 by doing” during an 18-month pilot project prior to filing the BYOD tariff. This experience proved
7 invaluable for ensuring that by the time tariff enrollment opened, the program delivered its
8 expected value.

9 This testimony deals specifically with VPPs composed of battery storage systems, but the core
10 operating concepts are similar for other technology types. Experience with this type of program
11 (aggregating and dispatching customer-sited resources via a software platform) can be extended
12 to help the Company plan and launch similar programs for other customer-sited flexible loads,
13 including EVs and electric water heaters. A report by The Brattle Group found that VPPs are
14 among the most cost-effective resources for providing resource adequacy.¹⁷

15 In essence, VPP expertise will become a tool in the Company’s tool belt to quickly meet new
16 capacity needs, for example if new load were to materialize beyond what was forecasted in the
17 2023 IRP.

18 **Q. ARE YOU PROPOSING THAT THE BYOD TARIFF TAKE THE PLACE OF OTHER**
19 **PROPOSED RESOURCES?**

20 A. No. I am proposing a BYOD tariff to complement the resources already proposed in the
21 Company’s 2023 IRP as part of the 1,000 MW of additional battery resources the Company
22 requested (p. 37 of Direct Testimony). The Company’s MG0 capacity expansion scenario provided
23 in its December 2023 supplemental filing (Document Filing #216585) builds 2,850 MW of battery
24 resources over the next 5 years. This demonstrates that adding more battery storage resources

¹⁵ https://liftoff.energy.gov/wp-content/uploads/2023/10/LIFTOFF_DOE_VVP_10062023_v4.pdf

¹⁶ <https://rmi.org/insight/virtual-power-plants-real-benefits/>

¹⁷ https://www.brattle.com/wp-content/uploads/2023/04/Real-Reliability-The-Value-of-Virtual-Power_5.3.2023.pdf

1 beyond what is currently proposed in the 2023 IRP would be part of the optimal supply mix
2 according to current load forecasts.

3 Without access to the Company's incremental capacity costs, it is difficult to directly compare the
4 cost of the BYOD tariff with other proposed resources. However, if the Commission believes a
5 residential BYOD tariff can provide the same services as other proposed resources at the same or
6 lower cost *and* lower risk of overinvestment, then it should take the place of those resources.

7 **Q. COULD ANY OF THE COMPANY'S EXISTING OR PROPOSED TARIFFS BE USED**
8 **TO SUPPORT A BYOD PROGRAM?**

9 A. No. While a battery could help a customer reduce their bills under either the Nights and
10 Weekend or Smart Usage tariffs by shifting demand from peak to off-peak hours, these tariffs do
11 not offer a mechanism for the Company to dispatch battery storage systems to meet bulk capacity
12 needs. Similarly, the RNR-11 tariff financially motivates customers to configure a battery to
13 maximize solar self-consumption. Under both, the time-of-use (TOU) tariffs available and RNR-
14 11, customers are only rewarded for configuring their battery in such a way as to minimize their
15 own bill, with no incentive to align discharging with system-wide peak periods. To unlock the full
16 value of residential energy storage, the Company must be able to dispatch systems directly, and to
17 do that they must compensate customers directly outside existing tariffs.

18 **Q. WHY ARE YOU PROPOSING A BYOD TARIFF AND NOT A PILOT PROGRAM?**

19 A. Residential batteries dispatched in aggregate are a proven resource that have been deployed by
20 utilities outside Georgia for resource adequacy. Pilot programs typically have enrollment caps and
21 create uncertainty for customers investing in distributed energy resources. Furthermore, the
22 Company has proposed two other tariffs to address the near-term capacity need in its 2023 IRP
23 (DCO-1 and DCL-1).

24

25 **IV. PROPOSAL FOR GEORGIA POWER RESIDENTIAL BYOD TARIFF**

26 **Q. WHAT ELEMENTS DO YOU BELIEVE SHOULD BE INCLUDED IN GEORGIA**
27 **POWER'S BYOD TARIFF?**

1 A. Besides the compensation structure, which I address below, a successful program design should
2 include the following elements:

3 1. **Event notification:** participating customers should be notified of battery discharge
4 events, ideally 24 hours in advance.

5 2. **Installer training and registration:** companies installing battery systems eligible for
6 enrollment in the BYOD tariff should be required to attend training sessions with the
7 Company so that they understand program rules and the compensation structure. The
8 Company should then publish a list of certified installers on their public website.

9 3. **Consumer protections:** certified installers should be required to submit, to the
10 Company, a standard disclosure form signed by the participating customer during the
11 interconnection application process. This standard disclosure should at minimum include
12 the contact information of all stakeholders, system specifications and cost, and a summary
13 of Program terms.

14 3. **Eligibility of multiple battery systems:** so as not to pick winners and losers in the
15 competitive residential storage market, the tariff should be open to multiple battery
16 manufacturers.¹⁸ There should also be a clear pathway for new battery companies to
17 become eligible for participation. A list of eligible systems should be made available on
18 the Company's website.

19 4. **Opting out of events:** consumers should be able to opt out of individual events. Opting
20 out would impact the customer's ongoing compensation payment via the calculation of
21 average event discharge, as described below.

22 5. **Maximum number of events and event duration:** BYOD control events should be
23 limited to a maximum of 60 per year, with a maximum event duration of 3 hours.

¹⁸ As stated by the VPUC in its final order on the BYOD Tariff, "Effective competition in the small-scale storage market will over time drive efficiency, lower prices, result in a diversity of services, and provide better-quality service for the benefit of all consumers. When utilities are engaged in competitive markets, there is the potential for them to exert market power that harms the development of competitive markets." (Vermont PUC Docket 19-3537-TF, Final Order).

1 **6. Use of battery inverter for metering:** performance during called events should be
2 measured using the battery’s inverter, which will avoid the need to install a secondary
3 utility meter. Using only the net export would undervalue the battery’s role in reducing
4 peak demand, since the customer’s real-time gross consumption is unaffected by the
5 battery’s behavior and would need to be met by other supply side resources.

6 **7. “Stackability”:** Customer participation in the BYOD tariff should not preclude them
7 from participating in any other utility program, residential tariff, or RNR.

8 **Q. DO YOU BELIEVE THE COMPANY SHOULD USE THE SAME COMPENSATION**
9 **STRUCTURE AS WHAT GMP USES FOR ITS BYOD TARIFF?**

10 A. No. While a purely upfront compensation payment is an effective mechanism to drive program
11 uptake, I believe it creates too much risk for non-participating billpayers. Further, compensating
12 customers for actual performance encourages ongoing program participation and therefore
13 sustained grid benefit.

14 I believe the compensation structure should be a hybrid of “upfront” and “ongoing” performance
15 compensation (implemented as a bill credit) based on the average discharge of the battery storage
16 system during called peak events, measured by the battery system’s inverter. The combination of
17 upfront and ongoing compensation balances between two objectives: rapid uptake (to meet the
18 urgency of the impending capacity need) and reducing risk to non-participants. An upfront
19 payment is important for reducing customers’ out-of-pocket costs, which often pose a barrier to
20 adoption.¹⁹ An ongoing payment, based on the average annual performance of the battery system,
21 will ensure that compensation is linked with actual realized program benefits. We propose that the
22 majority of compensation (60%) be allocated to ongoing compensation.

23 **Q. SHOULD THE PARTICIPANTS BE COMPENSATED BASED ON MONTHLY OR**
24 **ANNUAL EVENT PERFORMANCE?**

25 A. Compensation should be calculated based on average performance across all events in a
26 calendar year. There may be certain months in which no events are called (for example, the spring

¹⁹ In GMP’s BYOD pilot (the precursor to the BYOD tariff), uptake was extremely low under the initial compensation structure of exclusively ongoing payments.

1 or fall when temperatures are mild); participants should not be penalized for the lack of need for
2 peaking resources during those months. The compensation amount could be paid either as a single
3 lump sum or spread out evenly across the 12 months of the following calendar year to smooth out
4 the customer's bills.

5 **Q. WHAT WOULD BE AN APPROPRIATE COMPENSATION LEVEL AND PROGRAM**
6 **TERM?**

7 A. I believe a fair payment for this program should be determined jointly by the Company and the
8 Commission using a similar methodology as the draft DCO-1 tariff, which allocates 75% of the
9 projected program value to participating customers. However, unlike the DCO-1 tariff, which
10 appears to provide a guaranteed monthly credit, the ongoing compensation payment in the BYOD
11 tariff should be determined by actual performance. For the remainder of this testimony, I use a
12 placeholder value of \$250/kW-year for illustrative purposes.

13 The program term should be at least 5 years, both to create stability for participants and to meet
14 the capacity need until resources from the All-Source RFP become available. Over the 5-year
15 program term, the ongoing compensation *level* (\$/kW-year, multiplied by average event
16 performance to calculate payment) should remain the same. This will provide participants with the
17 certainty that if their systems perform as requested, they can expect to be rewarded at the same
18 compensation level over time. Without such a guarantee, it would be difficult to secure financing
19 to install an energy storage system.

20 From the \$250/kW-year placeholder value, we propose 40% be allocated to the upfront
21 compensation payment ($\$100/\text{kW-year} * 5 \text{ years} = \$500/\text{kW}$) and 60% be allocated to the ongoing
22 compensation payment ($\$150/\text{kW-year}$).

23 **Q. HOW WOULD UPFRONT COMPENSATION BE DETERMINED?**

24 A. At the time of enrollment, the customer will earn an upfront compensation amount based on the
25 battery's capacity available to the Company for dispatch during BYOD peak events. The enrolled
26 capacity is equal to the total energy capacity (in kWh) divided by 3 hours (the proposed maximum
27 event duration). For example, a residential storage system with an energy capacity of 15 kWh
28 would enroll $15 \text{ kWh} / 3 \text{ hours} = 5 \text{ kW}$.

1 **Q. CAN YOU PROVIDE AN EXAMPLE TO ILLUSTRATE HOW A CUSTOMER'S**
2 **COMPENSATION WOULD BE CALCULATED?**

3 A. The table below shows example event performance values for a single 15 kWh / 5 kW battery
4 system. In this simplified example, only 5 events are called during the calendar year.

Event Number	Event Duration (hours)	Discharge (kWh)	Average Discharge (kW)
1	2	10	5
2	3	15	5
3	3	12	4
4	3	0*	0
5	2	9	4.5

5 *customer opted out of this event

6 The customer's upfront compensation payment for enrolling the 5 kW battery would be:

7
$$\$100/\text{kW-year} * 5 \text{ years} * 5 \text{ kW} = \$2,500$$

8 The customer's annual performance-based compensation based on the event table above is:

9
$$\$150/\text{kW-year} * \frac{(5 + 5 + 4 + 0 + 4.5)}{5 \text{ events}} = \$555$$

10 **Q. SHOULD THERE BE A CLAWBACK PROVISION FOR THE UPFRONT PAYMENT**
11 **IF SYSTEMS DO NOT PERFORM AS EXPECTED?**

12 A. Yes. If a system enrolled in the BYOD tariff experiences a communication failure and it is not
13 remedied within 30 days after notification by the Company, the participant should be charged a
14 monthly fee that reflects 1/60th (reflecting the 60 months of the 5-year term) of the upfront
15 compensation payment. If a system is online but performs at a lower level than the initially-
16 enrolled amount, this would be reflected in the ongoing compensation payment. With the majority
17 of compensation (60%) tied to ongoing performance, participants will have a strong reason to
18 ensure that their systems are performing at the maximum level. Alternatively, the Company could
19 decide on a performance threshold (e.g. average discharge below 50% of initially enrolled
20 capacity) at which they would enact the clawback provision.

21 **Q. SHOULD THE COMPENSATION AMOUNT REMAIN THE SAME EACH YEAR?**

1 A. Not necessarily. Each year the Company may recalculate the value of peaking capacity based
2 on updated load and generation forecasts, or the previous year's average residential capacity costs.
3 This value would then be multiplied by 75% to arrive at the new "all-in" compensation amount
4 (\$/kW-year) for new systems enrolling in the tariff during that calendar year. The ongoing portion
5 of this amount should then be locked in for the 5-year term.

6 **Q. WHY NOT COMPENSATE CUSTOMERS BASED ON THEIR BATTERY'S**
7 **PERFORMANCE DURING THE ACTUAL PEAK HOUR EACH YEAR?**

8 A. There are a few issues with compensating based on performance during the actual annual peak
9 hour. First, there might be several hours (rather than a single hour) where the Company faces
10 capacity constraints during which customers should be incentivized to participate. If they were
11 only compensated based on a single hour, they might opt out of other events. Second, participants
12 might not receive compensation even if responding perfectly to called events. Such a scenario
13 could arise if the Company, through dispatch of customer-sited resources, shifted the peak to a
14 different hour in which batteries were not called upon to discharge. Figure 2 shows a simplified
15 case for such a scenario for a single day.

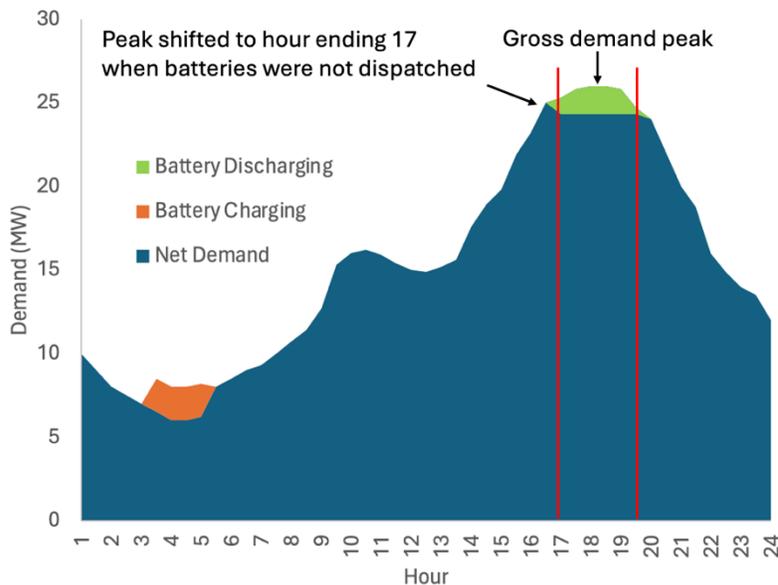


Figure 2: Illustration of peak shifting due to battery dispatch.

16

1 Participants should not bear the risk of forecasting peak demand or concern themselves about
2 whether event signals coincide with system peak demand. That is the Company’s domain of
3 expertise. If participants’ systems respond when signaled, they should receive full compensation.

4 **Q. WOULD BYOD OPERATION RESEMBLE OTHER EXISTING OR PROPOSED**
5 **GEORGIA POWER CUSTOMER PROGRAMS?**

6 A. Yes, the proposed BYOD tariff is similar to the Company’s existing Temp Check program,
7 which it is asking for permission to expand in the 2023 IRP. In that program, the Company
8 remotely adjusts the smart thermostats’ temperature setpoints during extremely hot or cold days.
9 The Company’s technology partner in that program, Uplight, also has experience working with
10 utilities to manage enrollment and operation of residential battery programs.

11 **Q. SHOULD PARTICIPANTS BE REQUIRED TO TAKE SERVICE ON A SPECIFIC**
12 **RESIDENTIAL SERVICE TARIFF?**

13 A. No. Program participation should not preclude customers from enrolling in any residential tariff
14 for which they are otherwise eligible. One of the advantages of battery storage is the potential for
15 value “stacking.” In addition to providing resource adequacy during hours with extremely high
16 system-wide demand, residential battery storage can be used to shift a home’s net consumption
17 towards hours when the marginal cost to generate and deliver power is low, reducing the
18 Company’s operating costs. BYOD participants should be compensated for services performed
19 outside of hours when they are called upon for resource adequacy, such as configuring their
20 batteries to “soak up” behind the meter generation (helping to avoid backfeeding energy to the
21 distribution grid) and participate in time-of-use rates.

22 **Q. SHOULD PARTICIPANTS BE REQUIRED TO INSTALL SOLAR AND STORAGE**
23 **TOGETHER LIKE IN DUKE ENERGY’S POWER PAIR PILOT?**

24 A. No. Participation should be open to customers with and without solar. While the coexistence of
25 solar and storage does offer resiliency benefits for extended outages, it does not affect the
26 program’s core value proposition, which is based on the storage resource’s performance during
27 system-wide peak hours. From this perspective, standalone storage charged from the grid provides
28 the same benefits as solar charged by an attached solar array.

1 However, it is worth noting that the pairing of solar and storage transforms residential solar into a
2 firm capacity resource that could be used in future resource planning. In its Direct Testimony, the
3 company stated (about its proposed utility-scale BESS projects):

4 “The BESS will also firm up the winter planning capacity of the existing solar facilities at
5 both sites by storing energy that can then be dispatched by system operators to benefit the
6 grid. Without BESS, the winter planning capacity for the solar resources at each site is 10%
7 of the nameplate capacity of each facility.” (p 36).

8 The same argument can be made for residential solar, which can be deployed much more quickly
9 than large-scale projects that are subject to risk of delays.

10 **Q. WHAT SHOULD BE THE PROCESS FOR INTERCONNECTING STANDALONE**
11 **STORAGE?**

12 A. As a form of inverter-based distributed generation, standalone storage should go through a
13 similar interconnection process as resources covered under the Company’s RNR-11 tariff.

14 **Q. SHOULD BATTERIES ENROLLED IN THE BYOD TARIFF BE ALLOWED TO**
15 **EXPORT TO THE GRID?**

16 A. Yes. The BYOD tariff is designed to help meet the Company’s capacity need, which is urgent
17 given the rapid demand growth. Capping battery discharge at the household’s real-time
18 consumption (i.e., disallowing export) would hamper the program’s ability to contribute to meeting
19 this need.

20 **Q. HOW SHOULD EXPORTED ENERGY BE COMPENSATED DURING CALLED**
21 **EVENTS?**

22 A. Energy exported to the grid during called events should be compensated under the
23 instantaneous netting provision of the RNR-11 tariff: the avoided energy rate plus 4 cents. When
24 charging the battery for the purpose of providing peaking capacity, the customer is either
25 purchasing energy from the grid at the full retail rate (for standalone storage or solar-plus-storage
26 when charging outside of solar hours) or foregoing export compensation under the RNR-11 tariff
27 (for solar-plus-storage charging during solar hours). This energy is not used for the customer’s
28 sole benefit but instead for the benefit of all billpayers. Compensating for the energy provided

1 (separate from the capacity) at the avoided cost + 4 cents ensures that participants are not unduly
2 penalized for providing this service.

3 **Q. WHAT DO YOU BELIEVE IS AN APPROPRIATE TARGET FOR THE BYOD**
4 **TARIFF?**

5 A. I believe 50 MW is an appropriate target, representing approximately 10,000 participants. GA
6 Solar believes that number is achievable prior to the winter of 2025/2026 as long as the tariff is
7 open for enrollment within 6 months of the final order of this docket.

8 **Q. DO YOU BELIEVE TARIFF ENROLLMENT SHOULD BE CAPPED?**

9 A. No. The compensation structure (reserving 25% of net present value for non-participants)
10 ensures that the program will provide net benefits to all customers. The tariff does not require
11 deployment of the Company's capital, instead leveraging private capital. As such, a cap is not
12 necessary or warranted.

13 **Q. WHAT IS A REASONABLE MAXIMUM FOR THE NUMBER OF EVENTS PER**
14 **YEAR AND THE NUMBER OF HOURS PER EVENT?**

15 A. There should be no more than 60 events per calendar year. The exact number should be
16 determined through an analysis of the Company's load forecast and the cost of constructing and
17 operating its existing and proposed generation resources. To give the Company maximum
18 operating flexibility, there should *not* be a limit on the number of events in a calendar month or
19 season, as long as the total number in the year does not exceed 60.

20 Each event should be capped at a maximum of three hours. This would not stop the Company from
21 calling shorter-duration events. In fact, the Company should always strive to call the shortest event
22 possible to meet the capacity need. In any case, compensation would be determined by the average
23 discharge value during events regardless of each event's duration.

24

25

V. CONCLUSION

26 **Q. WHAT OTHER BENEFITS BEYOND THOSE ALREADY DISCUSSED WOULD A**
27 **BYOD TARIFF PROVIDE THAT SHOULD BE CONSIDERED?**

1 A. Georgia has already emerged as a leading state for clean energy manufacturing, especially in
2 electric transportation and battery storage. A BYOD tariff would create jobs in the design, sale,
3 installation, operation, and maintenance of battery systems, complementing the state's
4 manufacturing industry and creating a pipeline to ensure that technologies built in Georgia serve
5 its residents.

6 **Q. WHAT ADDITIONAL DATA WOULD BE HELPFUL IN DETERMINING AN**
7 **APPROPRIATE LEVEL OF COMPENSATION FOR BYOD PARTICIPANTS?**

8 A. Hourly demand projections (both at the distribution and bulk system level) would enable further
9 analysis to calculate the avoided cost associated with dispatching batteries enrolled in the BYOD
10 tariff not only for hours in the year where all capacity resources are utilized but also as part of the
11 Company's economic dispatch model to displace high marginal cost generation at other hours.
12 Even if batteries are charging from the grid (versus on-site generation), the charging could occur
13 during hours with lower marginal cost generation.

14 **Q. DO YOU HAVE ANY CLOSING REMARKS TO MAKE TO THE COMMISSION ON**
15 **THE MATTERS THAT YOU HAVE ADDRESSED IN YOUR TESTIMONY?**

16 A. Yes. To summarize my testimony, Bring Your Own Device programs can provide cost-effective
17 resource adequacy at significantly lower overinvestment risk compared to large-scale capacity
18 resources. There are several operational BYOD programs in the US that provide a template for
19 successful program operation.

20 A BYOD tariff can be launched rapidly to meet the urgent capacity need in the Company's service
21 territory, leveraging private capital to benefit all customers. Unlike large-scale resources, a BYOD
22 program's size does not need to be planned years in advance; it can be scaled flexibly to match
23 additional capacity needs as they materialize, which reduces the risk of overforecasting demand
24 far into the future. A BYOD tariff will also expand the options for resilient backup power and
25 provide the Company with invaluable operational experience in managing distributed energy
26 resources, which can be used to meet both bulk system and distribution constraints.

1 I recommend that the Commission direct the Company to file within 6 months after the final order
2 in this docket a new tariff for a residential BYOD program as proposed in Section IV and
3 summarized in the Introduction.

4 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

5 A. Yes.