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BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. ER-2024-0261

DIRECT TESTIMONY AND EXHIBITS OF
MICHAEL MURRAY
ON BEHALF OF RENEW MISSOURI

July 2, 2025

TABLE OF CONTENTS

I. INTRODUCTION 3
II. PURPOSE OF TESTIMONY AND SUMMARY OF RECOMMENDATIONS 5
II. BACKGROUND 5
III. RECOMMENDATIONS 12
A. METHODOLOGY 12
B. REVENUE REQUIREMENT 19
C. JUSTIFICATION 19
D. STUDYING PARTICIPATION IN A REGIONAL DATA HUB 27
IV. CONCLUSION 29

I. INTRODUCTION

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

A. My name is Michael Murray. I am the President of Mission:data Coalition ("Mission:data"). My business address is 1752 NW Market Street #1513, Seattle, WA 98107.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS DOCKET?

A. I am testifying on behalf of Renew Missouri Advocates d/b/a Renew Missouri ("Renew Missouri"), an intervenor in this proceeding.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR RELEVANT PROFESSIONAL EXPERIENCE.

A. I co-founded Mission:data in 2013, and have led our efforts to intervene at public utility commissions on issues of data access, data privacy, advanced meters and the benefits of electronic access to energy usage data. In 2013, I intervened at the California Public Utilities Commission to successfully institute the first state-wide implementation of Green Button Connect My Data among the state's electric investor-owned utilities. Since then, I have intervened in 15 states and the District of Columbia to advocate for energy data "portability," a term I define below. I have authored publications and presented at dozens of conferences on state developments in energy data access, such as the National Association of Regulatory Utility Commissioners.

I began my career in 2004 as co-founder and CEO of Lucid, an energy management software company for commercial buildings, where I grew the company from zero to 40 employees and raised $10 million in venture capital. Lucid offered a cloud-based service that analyzes real-time meter data from thousands of commercial buildings across North America to support energy

efficiency. Lucid's customers included over 350 organizations, eight of the eight Ivy League universities and others. I hold two U.S. patents relating to energy data collection, sharing and analysis, #8,176,095 and #8,375,068. I earned a B.A. with highest honors from Oberlin College in 2004.

Q. IN WHAT PROCEEDINGS HAVE YOU TESTIFIED BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION?

A. I testified in Ameren Missouri's recent rate case, File No. ER-2024-0319.

Q. IN WHAT OTHER STATES HAVE YOU TESTIFIED BEFORE A PUBLIC UTILITY REGULATOR?

A. I have testified before the commissions of California, Colorado, Georgia, New Hampshire, New York, North Carolina, Ohio, Rhode Island, and Texas.

Q. WHAT IS THE MISSION:DATA COALITION?

A. Mission:data Coalition is a national coalition of approximately 25 technology companies delivering data-enabled distributed energy resources ("DERs") for residential, commercial and industrial customers. Our members – with sales in excess of $1 billion per year – have developed innovative services leveraging meter data and utility bill data that help customers reduce their bills. Our companies are focused on bringing energy efficiency solutions to a national market, and to realize that objective, it is vital that we empower consumers with convenient access to their own energy data in a consistent manner from state to state. Mission:data works with industry and policymakers to advance customers' ability to quickly and conveniently share their energy-related data with energy management companies of their choice.

II. PURPOSE OF TESTIMONY AND SUMMARY OF RECOMMENDATIONS

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to establish the need for Green Button Connect My Data ("GBC") and its associated revenue requirement. I describe the benefits that GBC offers to ratepayers and analyze costs from other jurisdictions in order to arrive at an estimate that is tailored to The Empire District Electric Company ("Liberty" or the "Company").

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. I recommend that the Commission add $201,000 to Liberty's revenue requirement. These funds would be used to implement GBC in order to help ratepayers better manage their electric bills. GBC would also allow aggregations of demand-side resources to participate in markets organized by Southwest Power Pool ("SPP") by providing secure, electronic access to customer data that is required by SPP. I also recommend that Liberty study its participation in a regional "data hub" that would enable broader access to energy-saving and bill-saving services.

II. BACKGROUND

Q. WHAT IS DATA PORTABILITY?

A. Data portability refers to the ability of a consumer to seamlessly move or "port" his or her data held by one corporation to another service provider. The driver behind data portability is twofold: to encourage competitive markets by using the internet, and to prevent formation of "data monopolies" in the information economy. Whereas the term "data access" pertains to a customer obtaining his or her own information from a utility – such as through a utility's web portal – portability refers to the transfer of customer-specific data from the utility to a third party directly,

without passing through the hands of the customer. The transfer of customer data is initiated upon the consent of the customer.

Q. IN WHAT SECTORS IS DATA PORTABILITY BEING ADOPTED?

A. Data portability is being adopted in the U.S. and around the world in sectors including banking, healthcare, social media and energy. In the U.S., several federal and state laws promote data portability. For example, in healthcare, the 21st Century Cures Act (2021) requires healthcare providers to support consumer-directed exchanges of medical information as a condition of receiving Medicare reimbursements.[1] In social media, Congress passed a law in 2024 that requires TikTok to provide all of a consumer's data in a "machine readable format" pursuant to any consumer request.[2] Also in social media, the Data Transfer Initiative is an effort led by Google, Facebook, Microsoft, Twitter/X and Apple to allow individuals to move their online data between different platforms, without the need for users to download and re-upload data.[3]

In the utility sector, data portability has been mandated in eight (8) states: California, Colorado, Illinois, Kentucky, Michigan, New Hampshire, New York and Texas. It is enabled by the standard known as Green Button Connect My Data, which I describe below.

Q. WHAT IS GREEN BUTTON CONNECT MY DATA?

A. Green Button Connect My Data ("GBC") is a technical standard, ratified by the North American Energy Standards Board ("NAESB"), for sharing customer usage, cost, and other related data. The standard was originally developed by the National Institute of Standards and Technology

[1] 21st Century Cures Act, 42 USC 201, Sec. 4004, Information Blocking (2016). Accessible at https://www.congress.gov/114/plaws/publ255/PLAW-114publ255.pdf
[2] Pub. L. 118–50, div. H, Apr. 24, 2024, 138 Stat. 955, Sec. 2(b).
[3] Data Transfer Initiative (https://dtinit.org/).

("NIST"), the Smart Grid Interoperability Panel and industry over several years. GBC has its roots in the American Recovery and Reinvestment Act of 2009, which directed the Federal Communications Commission to develop a national broadband plan to include digital strategies for "energy independence and efficiency." Goal #6 of the National Broadband Plan states, "To ensure that America leads in the clean energy economy, every American should be able to use broadband to track and manage their real-time energy consumption."[4]

With GBC, a utility provides an application programming interface ("API") for machine-to-machine communication that third party developers of energy management software can, with customer authorization, automatically and securely retrieve energy data. These authorizations are valid for an agreed upon time and can be revoked at any time by the consumer. The data received can then be accessed and analyzed by the third party, using web-based software tools or mobile device applications.

Q. WHERE HAS GREEN BUTTON CONNECT MY DATA BEEN IMPLEMENTED?

A. GBC has been deployed by numerous investor-owned utilities, both gas and electric, in states across the country:

- California: Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric
- Illinois: Ameren Illinois Company and Commonwealth Edison
- Kentucky: LG&E-Kentucky Utilities
- Michigan: Consumers Energy
- New York: Consolidated Edison and National Grid (both gas and electric)
- Texas: Oncor, Centerpoint, AEP Texas Central, AEP Texas North, and Texas-New Mexico Power (TNMP) in the competitive regions of Texas, as well as Entergy Texas, Inc.

[4] Federal Communications Commission (2010). "Connecting America: The National Broadband Plan," p. xiv-xv. https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf.

Approximately 41 million electric meters across the U.S. are covered by a GBC mandate.

Q. HAS GREEN BUTTON CONNECT MY DATA BEEN REQUIRED RECENTLY OF AMEREN MISSOURI?

A. Yes. In a settlement agreement approved by the Commission in File No. ER-2024-0319, Ameren Missouri was required to offer GBC.

Q. DOES LIBERTY PROVIDE GREEN BUTTON CONNECT MY DATA TODAY?

A. No, it does not.

Q. WHAT IS GREEN BUTTON DOWNLOAD MY DATA?

A. Green Button Download My Data is merely one component of the broader GBC standard: a file format for capturing a customer's *usage* data, such electricity use in kilowatt-hours, or natural gas use in therms. The format of Download My Data is XML. For a customer to use Download My Data, he or she must log in to their utility's website and find a "Download My Data" link. Once the file is downloaded, he or she can then upload it to a third party service, such as the website of rooftop solar installer or energy auditor. However, Download My Data is not considered "portability" as defined above because the data must pass through the customer's hands.

Q. IS GREEN BUTTON DOWNLOAD MY DATA ADEQUATE FOR ENERGY MANAGEMENT PURPOSES?

A. No. Green Button Download My Data is not true portability. Most energy management applications require continuous, ongoing access to customer energy data. It is not realistic to expect modern customers to log in every day to their utility's website, download their data, and upload it into an energy management application, such as a mobile "app."

Q. HAS GREEN BUTTON GENERALLY BEEN ADDRESSED BY THE COMMISSION BEFORE?

A. Yes. In addition to Ameren Missouri's recent rate case (File No. ER-2024-0319) mentioned above, the Commission addressed Green Button in Liberty's 2021 rate case, File No. ER-2021-0312. The order stated:

> Customers served with an Advanced Metering Infrastructure ("AMI") meter will have online access to data from their AMI meter and be able to download data for all accounts by March 31, 2024, with the Empire having a goal to provide such access by March 31, 2023. If determined to be economically feasible, these capabilities will include the ability to download data for all customer accounts.[5]

Q. DOES THAT MEAN LIBERTY OFFERS GREEN BUTTON DOWNLOAD MY DATA?

A. Yes.

Q. IS THAT ADEQUATE IN YOUR VIEW?

A. No. Whether residential or small business customers simply want to save on their utility bills, or whether those customers want to participate in an aggregator's service of providing demand response to SPP markets and thereby reduce system-wide energy costs, GBC is needed because it allows customers and aggregators to quickly and easily assess the usage patterns of thousands of sites with automated software tools. Provided that the data sent from Liberty through GBC are accurate, complete, easily accessible and reliable, GBC is the best method for bringing

[5] In the Matter of the Request of The Empire District Electric Company d/b/a Liberty for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in its Missouri Service Area, *Order Approving Stipulations and Agreement*. File No. ER-2021-0312, issued March 9th, 2022 at para. 23.

data-driven, tailored energy management solutions to Liberty customers from the competitive market.

Q. WHAT IS ANOTHER REASON THAT GREEN BUTTON DOWNLOAD MY DATA IS INADEQUATE?

A. As implemented by Liberty, Green Button Download My Data only provides electric usage data. However, SPP requires additional customer data in order to participate in wholesale markets, such as premise address and pricing node, discussed further below. Energy management applications need other information as well, such as premise address, the applicable rate for a given customer, and bill details.

Q. HAS THE COMMISSION RELIED ON GREEN BUTTON IN ITS ORDERS REGARDING DISTRIBUTED ENERGY RESOURCE PARTICIPATION IN WHOLSALE MARKETS?

A. Yes. In File No. EW-2021-0267 concerning the Federal Energy Regulatory Commission's ("FERC") Order 2222, the Commission modified its temporary ban on distributed energy resource ("DER") aggregators participating in capacity, energy, and ancillary services markets. In its decision, the Commission referenced Green Button, although it was ambiguous whether the Commission was referring to GBC or Green Button Download My Data. In response to the Commission's request for comment, the Office of Public Counsel ("OPC") stated:

> The OPC has filed testimony supporting that utilities use the Green Button functionality and each of the electric utilities have entered into stipulation and agreements to utilize the Green Button functionality to mitigate data transfer

> concerns. That unique platform should allow for secure transfer of finite customer data to 3rd party vendors.[6]

The Commission referenced OPC's statement above in reaching its order dated December 11, 2023. In explaining its reasoning for lowering the threshold for DER aggregator participation to customers with 100 kW of peak demand, the Commission stated as follows:

> Regarding data governance and cybersecurity issues, both MISO and SPP rules include confidentiality provisions. Voltus and CPower described how their technology is designed to protect against cybersecurity threats. In addition, Missouri's utilities are utilizing Green Button functionality that should allow for secure transfer of customer data to third parties. As experience is gained with ARCs in Missouri, all stakeholders will be able to raise issues in this working docket or in other dockets for Commission consideration.

Q. WHAT IS YOUR REACTION TO THE COMMISSION'S DECISION CITED ABOVE IN FILE NO. EW-2021-0267?

A. Based on my review of filings in that proceeding, it is clear the stakeholders were not fully briefed on the topic of Green Button at that time. For example, the distinction between GBC and Green Button Download My Data was never made. There was also no discussion about the availability of other customer-specific data points, besides kWh usage data, that are exclusively held by electric utilities and that are required by SPP for DER aggregations to register and settle in wholesale markets. While understandable, the Commission was not aware of critical details about data portability that directly affect whether DER aggregators are able to have the ability to compete in wholesale markets.

[6] In the Matter of the Establishment of a Working Case Regarding FERC Order 2222 Regarding Participation of Distributed Energy Resource Aggregators in Markets Operated by Regional Transmission Organizations and Independent System Operators, File No. EW-2021-0267, *Public Counsel's Additional Comments,* dated June 22, 2023, at 5.

Since modifications to DER participation in wholesale power markets have been in place for almost two years and the Commission seeks to incorporate lessons learned into its policies, now is an excellent time for the Commission to improve the ways in which Liberty provides customer energy data electronically to customer-authorized energy management firms, whether for purposes of simply managing utility bills or for facilitating DER participation in wholesale markets.

III. RECOMMENDATIONS

A. METHODOLOGY

Q. HOW DID YOU DEVELOP COST ESTIMATES FOR GBC IMPLEMENTATION BY LIBERTY?

A. I took the average of known costs from GBC implementations in other jurisdictions during the period 2017-2020. This represents the best and most recent information available. The cost figures are expressed per customer, and I multiplied the average cost by 168,657, the number of Liberty's electric meters given by the Energy Information Administration.[7]

Q. WHAT OTHER JURISDICTIONS HAVE ASSESSED THE COSTS OF GREEN BUTTON CONNECT MY DATA?

A. The jurisdictions that have completed an assessment of the costs of GBC, or systems similar to GBC, include California, Colorado, Ohio, New York, North Carolina, Texas, and Ontario, Canada.

[7] Form EIA-861 2023. Available at https://www.eia.gov/electricity/data/eia861/.

Q. WHAT COSTS WERE ESTIMATED (OR INCURRED) IN VARIOUS JURISDICTIONS?

A. Since 2012, some utilities have developed GBC systems, or systems similar to GBC, and their actual costs are reported below. Others have developed cost estimates for similar data-sharing IT systems but have not yet implemented them: Duke Energy, in North Carolina; AEP, in Ohio; and the government of Ontario, Canada for all of its electric and gas utilities. The table below is listed chronologically in the order in which costs were estimated.

Utility/Territory	*Year*	*Initial (one-time) cost*	*Annual cost*	*Number of electric meters (2017)*	*First year cost per electric meter*
Texas TDSPs[8]	2012	unclear[9]	$9,282,000	7,262,553	$1.28
Pacific Gas & Electric[10]	2013	$19,400,000	unclear	5,363,705	$3.62
Southern California Edison[11]	2013	$7,588,000	$1,512,000	5,158,889	$1.47
Xcel Energy (CO)[12]	2015	$2,000,000	unclear	1,339,534	$1.49
Consolidated Edison (NY)[13]	2016	$9,009,000	$1,195,000	3,464,957	$2.60

[8] Texas Transmission and Distribution Service Providers (TDSPs), which include Oncor, Centerpoint, AEP Texas Central, AEP Texas North, and Texas-New Mexico Power (TNMP).

[9] Texas TDSPs report only the annual cost of Smart Meter Texas, which is administered by IBM. See Project No. 49730, *Compliance Filing of Oncor regarding Smart Meter Texas's project budget for 2020*. January 31, 2020.

[10] California Public Utilities Commission. Decision D.13-09-025, September 23, 2013 (hereafter "California Decision") at 2. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M077/K191/77191980.PDF.

[11] *Id.*

[12] Price quote as given from Opower/Oracle to Xcel via email dated October 12, 2015. Exhibit No. Mission:data-2, *Prepared Rebuttal Testimony of Michael Murray on Behalf of the Mission:data Coalition.* California Public Utilities Commission. Application (A.18-11-005), April 26, 2019, at Bates 51-52.

[13] Consolidated Edison, *Customer Engagement Plan*. Slides presented at Stakeholder Collaboration Meeting July 15, 2016, at 21.

Ontario, Canada (low)[14]	2017	CAD$4.69 million over 5 years		5,159,331	$0.14
Ontario, Canada (high)	2017	CAD$8.96 million over 5 years		5,159,331	$0.27
AEP Ohio[15]	2018	$900,000	$75,000	1,498,405	$0.60
Duke Energy (NC)[16]	2019	$850,000	$52,000	3,276,005	$0.26
National Grid (NY)[17]	2020	$3,000,000	unclear	1,738,843	$1.73
				Average cost (all):	*$1.35*
				Average cost (2017-2020):	*$0.60*

Table 1: GBC cost estimates, 2012-2020.

[14] Low and high estimates of direct costs estimated over a 5-year period. Converted into U.S. dollars by multiplying by 0.7711. First year cost determined by dividing the cost by five. *Ontario Green Button Cost-Benefit Analysis Report (hereafter "Ontario Report")*. Prepared for the Ontario, Canada Ministry of Energy by Dunsky Energy Consulting. October 2017, Tables 39-40 at 60.

[15] AEP Ohio presentation dated June 2018 to the gridSMART Collaborative working group pursuant to Case No. 13-1939-EL-RDR.

[16] Duke Energy cost-benefit analysis, April 12, 2019, as required by North Carolina Utilities Commission order dated March 7th, 2018, in Docket No. E-100 Sub 147.

[17] Niagara Mohawk Power Corporation d/b/a National Grid. *Fiscal Year 2021 Information Technology Capital Investment Plan Report*. New York Public Service Commission, Case Nos. 17-E-0238 and 17-G-0239. April 10, 2020, at Attachment 1, p. 2.

Q. HAS ONE OF LIBERTY'S AFFILIATES CONDUCTED A COST ESTIMATE FOR GREEN BUTTON CONNECT MY DATA?

A. Only partially. Liberty's New Hampshire affiliate, Granite State Electric, is involved with the development of a state-wide energy data sharing platform in New Hampshire. Recently, an independent consultant evaluated the potential cost for Granite State Electric to integrate its back-end metering and billing systems with the state-wide platform design under consideration. The cost estimate was $2.4 million initially, followed by $50,000 annually.[18] There are numerous differences between Missouri and New Hampshire, including the state-wide platform design and agreed-upon data model in New Hampshire, the fact that AMI in New Hampshire has not yet been fully deployed, and other factors. In other words, it is not an "apples to apples" comparison with Missouri. For these reasons, I have excluded New Hampshire's recent cost estimate from consideration in this proceeding.

Q. PLEASE EXPLAIN AEP OHIO'S COST ESTIMATE.

A. As part of a settlement in Case No. 13-1939-EL-RDR approved by the Public Utilities Commission of Ohio ("PUCO"), AEP agreed to "monitor the implementation costs and associated customer benefits of Green Button Connect." In 2018, AEP provided a cost estimate of GBC to a PUCO working group. The cost reported was $750,000 for initial IT investment plus $150,000 for a sandbox test environment, making the total initial cost $900,000. An annual cost of $75,000 was estimated for ongoing support. AEP Ohio provides electricity to 1.5 million customers in Ohio.

[18] *New Hampshire Electric and Gas Utilities Online Multi-Use Energy Data Platform*. Esource report dated September 2024 in Docket No. DE 19-197, New Hampshire Public Utilities Commission at 4. https://www.puc.nh.gov/VirtualFileRoom/ShowDocument.aspx?DocumentId=fb73878c-cb4a-4dad-a66d-742d8b1a25d8

It is unclear exactly what technical features are included or excluded from the price estimate, as additional information from AEP was not provided. However, AEP understood how GBC functions and what GBC is intended to achieve – namely, the exchange of customer energy information with authorized third parties – based upon discussions in a working group that met regularly throughout 2018 as was ordered by the PUCO.

Q. PLEASE EXPLAIN DUKE ENERGY'S COST ESTIMATE.

A. Pursuant to a 2018 North Carolina Utilities Commission order, Duke Energy was required to hold stakeholder meetings to discuss data access topics.[19] At a stakeholder meeting dated April 12, 2019, Duke Energy provided a cost estimate to implement GBC. In addition to offering customer-facing capabilities as required by the GBC technical standard, Duke Energy includes in its estimate certain IT system features including "customer information system extract, transform load (ETL) protocols" and "integration with customer portals, meter data, external testing and validation." The up-front cost to develop GBC is $850,000, with annual maintenance costs of $52,000. Duke Energy operating companies, Duke Energy Carolinas and Duke Energy Progress, together serve approximately 3.4 million electric customers with advanced meters in North Carolina.

[19] State of North Carolina Utilities Commission, Docket No. E-100, Sub 147. *Order Accepting DNC's and DEC's SGTP Updates, Requiring Additional Information From DEP, and Directing DEC and DEP to Convene a Meeting Regarding Access to Customer Usage Data*. March 7, 2018, at 11. Available at https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=6168d3c2-b144-42dc-8fc2-1e3079866f67

Q. PLEASE EXPLAIN XCEL ENERGY'S COST ESTIMATE.

A. In Docket No. 16A-0588E before the Colorado Public Utilities Commission, Xcel Energy disclosed that its estimated cost to develop GBC is $1.6 million to $2.0 million. No information was given on annual or recurring costs. The initial development included registering third parties, authenticating third parties, allowing customer authorization and de-authorization, developing application programming interfaces ("APIs") to serve usage data as well as billing data, creating a separate role for third parties to securely access Xcel's information technology systems and offering a sandbox environment for testing. In a settlement agreement approved by the Colorado Commission in 2017, Xcel Energy was granted approval to spend up to $2.0 million developing GBC. Xcel Energy serves electricity and natural gas to 1.6 million customers in Colorado.

Q. PLEASE EXPLAIN NATIONAL GRID'S COST ESTIMATE.

A. Several orders from New York's Commission have required utilities pursuing advanced metering infrastructure ("AMI") to provide GBC.[20] National Grid notified the New York Commission it would spend up to $3 million on capital expenses associated with GBC, to be implemented by March 31, 2021.[21]

[20] See, *e.g.*, Case 16-M-0411. New York Public Service Commission. *Order Adopting Distributed System Implementation Plan Guidance.* April 20, 2016.

[21] Niagara Mohawk Power Corporation d/b/a National Grid. *Fiscal Year 2021 Information Technology Capital Investment Plan Report*. New York Public Service Commission, Case Nos. 17-E-0238 and 17-G-0239. April 10, 2020, at Attachment 1, p. 2.

Q. WHAT DO YOU OBSERVE ABOUT THE COSTS YOU CITE ABOVE AND THEIR APPLICABILITY TO LIBERTY?

A. Some reported costs are up-front while others are a mix of up-front and ongoing expenses. In addition, the reported software features are not categorized identically. As a result, it is difficult to compare costs on an "apples to apples" basis. Nevertheless, by treating the larger of the cost information provided as the first-year implementation cost, I calculate a range of $0.14 to $3.62 per electric meter.

However, I think it is both wise and appropriate for the Commission to exclude from consideration the above cost estimates from 2016 and earlier. This is because software offerings, and the Green Button standard generally, have significantly matured over time. When Texas utilities contracted with IBM in 2012 to develop Smart Meter Texas, nothing like it had ever been built before, and as a result, an entirely custom-built software system was constructed, and IBM has been compensated for taking that large risk. Similarly, when California utilities were ordered to implement GBC in 2013, the GBC standard was barely finalized, and no off-the-shelf GBC software products existed at that time. Today, however, several vendors offer GBC software, and the scope of work that utilities confront is much better known. As a result, I believe the range of $0.14 to $1.73, based on cost estimates from 2017-2020, is more appropriate and realistic for Missouri. The average of these values is $0.60 per meter.

Q. WHY ARE GBC COSTS FROM 2021-2025 NOT INCLUDED IN YOUR ANALYSIS?

A. Because that information is not available. During the period 2021-2024, a number of utilities began offering GBC for the first time, including LG&E-KU, Entergy Texas Inc., Consumers Energy in Michigan, and numerous utilities in Ontario, Canada. However, despite several attempts, I am not able to obtain cost figures from any of those utilities.

B. REVENUE REQUIREMENT

Q. WHAT IS THE REVENUE REQUIREMENT THAT YOU RECOMMEND FOR LIBERTY TO IMPLEMENT GBC?

A. $201,000. This has two components: $101,000 for GBC implementation, and $100,000 to study participation in a regional data hub, a concept I further describe below.

Q. HOW DID YOU DEVELOP COST ESTIMATES FOR GBC IMPLEMENTATION BY LIBERTY?

A. I used the average first-year cost of $0.60 per customer based upon Table 1 for GBC implementations during the period 2017-2020 and multiplied by 168,657, the number of electric meters served by Liberty according to EIA in 2023.

C. JUSTIFICATION

Q. WHAT ARE THE BENEFITS OF GREEN BUTTON CONNECT MY DATA?

A. Thanks in part to widespread advanced metering, an innovative market has developed across the country to help consumers manage their monthly bills or earn money by participating in demand response programs. These offerings – such as smartphone applications – are not

generally available from monopoly utilities; instead, they are provided by competitive firms. Key to the availability and success of these offerings is the electronic, automated delivery of customer data from electric utilities upon the customer's request.

Q. HAVE OTHER JURISDICTIONS ESTIMATED THE BENEFITS OF GBC?

A. Yes, four jurisdictions have estimated the benefits to ratepayers of GBC. AEP Ohio estimated 1.1% to 2.5% energy savings,[22] and Duke Energy estimated 1% to 5% energy savings.[23] In a study by Dunsky Energy Consulting in 2023, New Hampshire found potential benefits state-wide of between $10 million to $94 million; by dividing by the number of electric meters in the utilities covered by the study, this equates to a benefits range of $14.17 to $133.20 per customer.[24]

Perhaps the most detailed analysis of benefits was done for the Ontario, Canada government by Dunsky Energy Consulting in 2017. Ontario calculated benefit-to-cost ratios of 3.2 to 4.4 depending on various scenarios and timeframes. Ontario estimated 2% to 10% electricity and natural gas savings for residential customers who participated in data-driven energy savings offerings, and 2% to 10% electricity and natural gas savings for non-residential customers participating in an energy savings offering.[25] The adoption of energy savings offerings enabled by GBC were forecasted according to a product diffusion model in which various efficiency services saw increasing uptake over time, such as behavioral conservation approaches growing gradually

[22] AEP Ohio cost-benefit analysis. Workpaper provided in gridSMART collaborative, June 2018.

[23] Duke Energy cost-benefit analysis. April 12, 2019, as required by North Carolina Utilities Commission order dated March 7th, 2018, in Docket No. E-100 Sub 147.

[24] Presentation of Eversource, Liberty Utilities and Unitil to the New Hampshire Public Utilities Commission dated October 12th, 2024. Available at https://www.puc.nh.gov/Regulatory/Docketbk/2019/19-197/LETTERS-MEMOS-TARIFFS/19-197_2023-10-09_GSEC_JOINT-GOVERNANCE-COUNCIL-GRIP-PRESENTATION.PDF

[25] *Ontario Green Button Cost-Benefit Analysis Report (hereafter "Ontario Report")*. Prepared for the Ontario, Canada Ministry of Energy by Dunsky Energy Consulting. October 2017 at 30.

from 0% adoption to 4% over ten years, and operational efficiencies in commercial buildings assisted by data-driven energy management services would rise from 0% to 25% market penetration over ten years.[26] In addition, other financial benefits beyond reduced utility bills were found. Large commercial customers were estimated to see a CAD$180 benefit per customer per year in avoided cost as a result of easy access to benchmarking and portfolio energy analysis. Similarly, small commercial customers were estimated to see a CAD$198 benefit per customer per year in avoided costs.[27]

In addition to quantitative estimates, Ontario considered qualitative benefits of GBC. These included real but hard-to-measure values, such as greater innovation from demand-side management programs; economic development benefits from DER deployment; and increased customer satisfaction.

Q. DOES GBC PROVIDE DEMAND RESPONSE BENEFITS TO LIBERTY RATEPAYERS?

A. Yes. One of the key barriers to widespread participation of residential and commercial customer participation in demand response markets at SPP is the cost and availability of energy usage information for each customer. While larger industrial facilities can install their own metering equipment, smaller customers cannot. Demand response providers are thus unable to bring these customers into the market, which would help mitigate peak demand costs.

[26] *Ontario Report* at 33-34.

[27] *Ontario Report* at 28.

Q. WHAT CUSTOMER DATA IS REQUIRED BY SPP THAT CAN BE SATISFIED BY GBC?

A. Based on an analysis by Mission:data, the types of customer data necessary to register and settle dispatchable demand response ("DDR") resources and block demand response ("BDR") resources at SPP are shown in Table 2. Currently, none of the information in Table 2 below is electronically and automatically accessible from Liberty in a standardized way, even if a customer grants their explicit permission. Everything except the last item involving real-time telemetry can be provided by Liberty via GBC.

Data type	***Required of DDRs***	***Required of BDRs***
60-minute usage	No	Yes
5-minute usage	Yes	No
Premise address	Yes	Yes
Pricing Node (PNode)	Yes	Yes
10-second usage (telemetered)	Yes	Yes

Table 2: Data requirements of SPP markets, gathered from SPP Market Protocols (Rev 106).

Q. CAN'T DER AGGREGATORS GET CUSTOMERS' PREMISE ADDRESS FROM THE CUSTOMER DIRECTLY?

A. They can, but minor differences between address formats can frustrate the registration of DERs at SPP. For example, if Liberty's record of a premise address is "123 Main Street" but the customer tells the DER aggregator that its address is "123 Main St.," the contracted form of "Street" could lead to a mismatch during the SPP resource registration process, thereby preventing the customer from participating. This is why it is essential that Liberty provide this information via GBC.

Q. IN ADDITION TO THE SPP INFORMATION ABOVE, SHOULD LIBERTY INCLUDE ELECTRONIC BILLING AND ACCOUNT HISTORY IN GBC FOR ENERGY MANAGEMENT PURPOSES?

A. Yes. Without standardized, machine-readable access to historical billing and account data, customers will not be able to access new services that depend upon streamlined, zero-cost electronic accessibility, including, but not limited to: cost analysis software, automated bill audits that search for overcharges, financial benchmarking services against peers, and even certain financial products that allow customers to borrow money for efficiency improvements. It will also be difficult for customers to know whether investments they have made in energy efficiency ("EE") are paying off, because EE firms cannot easily access the customer's bills.

For commercial customers, including multifamily property owners, the lack of software-readable billing histories means that many such customers turn to the market and pay for bill digitization services. An industry in its own right, bill digitization serves the needs of many multi-site building owners or managers who must capture, understand, benchmark and ultimately pay

dozens, hundreds or even thousands of bills from different utilities across the U.S. every month. The inclusion of 24-48 months of historical billing data, as well as ongoing bills as they are generated, via GBC would significantly benefit these customers by avoiding the costs of bill digitization services and significantly reducing the time needed to process billing data.

While larger enterprises can afford bill digitization services to manage their utility expenses and track energy usage, these types of services are prohibitively expensive for smaller customers such as nonprofit low-income housing organizations, small businesses, and individual owners and tenants. These customers cannot afford bill digitization and instead often use inefficient, paper-based processes. For these customers, access to detailed, machine-readable bill data means that it will become easier to monitor and pay their bills, save money and access new services.

In addition, organizations such as property owners with a nation-wide presence want to perform analysis for properties across states, utility companies, and types of tariffs. While these categories can be interpreted from bills, it is difficult and unreliable as utility companies use different names for the types of usage and charges. Including billing information in standardized categorizations will eliminate guesswork and decrease the time and resources spent on analysis. Moreover, the bill digitization process can introduce inaccuracies, because optical character recognition ("OCR") and other techniques performed to extract data from printed bills and bill images are not always perfect. Customers would benefit by having accurate representations of their bills available from Liberty in an electronic, automated fashion via GBC.

Q. ARE BILLING INFORMATION, ACCOUNT INFORMATION, PREMISE ADDRESS AND PRICING NODE DATA TYPES SUPPORTED BY THE GBC STANDARD?

A. Yes. As mentioned above, one of the key distinctions of GBC from Green Button Download My Data is that GBC supports much more information than simply kWh usage data. While kWh usage data is important for energy management, it alone is not sufficient. The GBC standard can easily accommodate additional information.

Q. WHAT OTHER TYPES OF CUSTOMER DATA ARE IMPORTANT TO BE INCLUDED IN GBC?

A. It is critical that "billing-quality" usage data be available to customer-authorized entities, such as DER aggregators. Interval electric usage data from advanced meters has varying levels of quality as it is processed by Liberty's software systems. It is standard operating procedure for utilities to process and "clean" incoming usage data from meters prior to generating bills. This is known as validating, editing and estimating ("VEE").

One of the key lessons learned from other jurisdictions is that, when electric utilities provide only the "raw" usage data that has not gone through VEE, significant uncertainty is created that undermines energy management purposes. For example, if a DER aggregator provides only the "raw" usage data to SPP for settlement, the DER aggregator could be penalized for not providing the final, VEE usage data. I note that questions about AMI meter data validation have been raised in discovery in this proceeding, highlighting the importance of this issue.[28]

[28] See, e.g., Liberty response to Staff data request 0191.2, 0191.3.

Fortunately, the GBC standard accommodates an attribute of each 15-minute or 60-minute kWh usage value as it goes through the VEE process known as "ReadingQuality." It is an optional data type, designed to provide third parties with status updates on interval usage quality over time. I will address this issue more thoroughly in forthcoming direct testimony focused on policy matters.

Q. WHY DO YOU BELIEVE YOUR COST ESTIMATE FOR GBC IS APPROPRIATE?

A. Liberty's Customer First is very large project, representing a wholesale modernization of Liberty's back-office software systems. The cost per customer is very large, some $970 per customer.[29] Based on my experience working with utilities and regulators across 15 states, I know that it is significantly easier and less costly to provide via GBC all of the customer data types I have described when the utility has modern information technology systems. In particular, the back-end integration costs will be significantly lower, because premise addresses, the "readingQuality" attribute, and other customer characteristics require less effort to extract, transform and load from various systems.

Second, my estimate is based upon the best available information from other jurisdictions.

[29] Customer First total cost attributable to Liberty of $163.53 million divided by 168,657 meters. Liberty response to data request 0252.

D. STUDYING PARTICIPATION IN A REGIONAL DATA HUB

Q. WHAT IS YOUR NEXT RECOMMENDATION CONCERNING A REGIONAL DATA HUB?

A. I further recommend that Liberty should add $100,000 to the revenue requirement in order to study the possibility of participating in a centralized "data hub." A data hub refers to a GBC platform that several utilities participate in. In practice, a data hub means that a third party can receive information from a single place, regardless of which utility is providing the underlying data.

Q. PLEASE FURTHER DESCRIBE YOUR RECOMMENDATION.

A. To achieve maximum ratepayer benefits, it is helpful for all electric and natural gas utilities in Missouri to offer GBC. But not only should each utility, including Liberty, adhere to the GBC standard on their own; it is also important that the information provided (subject to a customer's authorization) is accessible through a single interface, known as an application programming interface ("API"). This ensures that customers in Missouri's smaller utilities are not "left out" of the DER market. DER providers incur costs on a per-API basis for managing the ongoing data flow, maintenance, accommodating security or functional updates over time, etc. Multiple separate GBC APIs, one for each electric utility and gas utility, mean in practice that many, if not most, DER providers will decline to serve Missouri's small customer base relative to other states. Instead, if Liberty were to participate as part of a regional data hub, the market for competitive energy management services would benefit from economies of scale by virtue of having a single "point of entry" across millions of consumers. Note that the underlying customer data need not be transferred from each utility and stored separately in a centralized repository; rather, the API

provides a "gateway" into the customer data that is already stored and maintained by each utility individually, even if it appears from the third party's point of view that the customer data is centralized.

Q. WHAT OTHER STATES HAVE DATA HUBS?

A. Currently, Texas and New York have data hubs, covering many of their electric and gas utilities. New Hampshire is also exploring a state-wide, and possibly multi-state, data hub, with a request for proposals issued in June 2025.

Q. WHAT OTHER STATES AND UTILITIES SHOULD LIBERTY CONSIDER JOINING WITH AS PART OF THE STUDY YOU PROPOSE?

A. I recommend that Liberty engage with other electric and gas utilities in other SPP states such as Illinois, Nebraska and Oklahoma to evaluate the costs and benefits of a centralized data hub.

Q. FINALLY, ARE THERE OTHER SPECIFIC DETAILS CONCERNING GREEN BUTTON CONNECT MY DATA OR THE REGIONAL DATA HUB THAT YOU RECOMMEND?

A. I have other detailed recommendations, such as the amount of historical information that should be provided, performance requirements and the customer experience. But rather than describe them here, I will detail them as policy recommendations in forthcoming direct rate design testimony, to be filed on July 21, 2025. For now, the information I have provided is sufficient for determining Liberty's revenue requirement for the upcoming rate period.

IV. CONCLUSION

Q. WHAT IS YOUR CONCLUSION?

A. Across the U.S., numerous other state commissions have required utilities to implement data-sharing platforms of various types. My objective is ensure that Missouri joins these other states in creating bill-saving opportunities for ratepayers. Not only would consumers be able to reduce their energy usage; they would be able to participate in demand response offerings, which mitigate system-wide peaks. The cost estimates I provide are reasonable and are based on recent costs from other jurisdictions. When combined with my forthcoming policy recommendations that refine the details of data portability for Missouri, the Commission should require GBC implementation as I have described.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Request of The Empire District Electric Company d/b/a Liberty for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers In its Missouri Service Area	)))))	**File No. ER-2024-0261** Tracking No. JE-2025-0069

AFFIDAVIT OF MICHAEL MURRAY

STATE OF WASHINGTON)
) **ss**
COUNTY OF OKANOGAN)

COMES NOW Michael Murray, and on his oath states that he is of sound mind and lawful age; that he prepared the foregoing Direct Testimony; and that the same is true and correct to the best of his knowledge and belief.

Further the Affiant sayeth not.

M E Murray
Michael Murray

Subscribed and sworn before me this 1st day of July 2025.

Monica A. Johnson
Notary Public

MONICA A JOHNSON NOTARY PUBLIC STATE OF WASHINGTON My Comm. Expires February 25, 2029 No. 21012626

My commission expires: 2/25/29