

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC JOINT APPLICATION OF)	
KENTUCKY UTILITIES COMPANY AND)	CASE NO.
LOUISVILLE GAS AND ELECTRIC COMPANY)	2022-00402
FOR CERTIFICATES OF PUBLIC)	
CONVENIENCE AND NECESSITY AND SITE)	
COMPATIBILITY CERTIFICATES AND)	
APPROVAL OF A DEMAND SIDE)	
MANAGEMENT PLAN)	

TESTIMONY OF JIM GREVATT

**ON BEHALF OF JOINT INTERVENORS METROPOLITAN HOUSING
COALITION, KENTUCKIANS FOR THE COMMONWEALTH, KENTUCKY
SOLAR ENERGY SOCIETY AND MOUNTAIN ASSOCIATION**

July 14, 2023

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1 **I. INTRODUCTIONS & QUALIFICATIONS**

2 **Q. Please state for the record your name and business address.**

3 A. My name is Jim Grevatt. I am a Managing Consultant at Energy Futures Group (“EFG”),
4 located at 10298 Route 116, Hinesburg, VT 05461.

5 **Q. On whose behalf are you testifying in this proceeding?**

6 A. I am testifying on behalf of Metropolitan Housing Coalition (“MHC”), Kentuckians for
7 the Commonwealth (“KFTC”), Kentucky Solar Energy Society (“KYES”), and
8 Mountain Association (“MA”) (collectively, “Joint Intervenors”).

9 **Q. Please describe your professional background.**

10 A. I have worked in the energy efficiency industry since 1991 in a wide variety of roles.
11 Prior to joining EFG, I served as the Director of Residential Energy Services at
12 Efficiency Vermont and the District of Columbia Sustainable Energy Utility. I also
13 served as the Manager of Energy Services at Vermont Gas Systems, managing both
14 residential and commercial utility energy efficiency programs. I have extensive hands-on
15 experience conducting hundreds of energy audits for Vermont’s Low-Income
16 Weatherization Assistance Program and Vermont Gas Systems’ demand side
17 management programs. In my current role as Managing Consultant at EFG, I have
18 advised regulators, utilities, and other energy efficiency program administrators,
19 environmental organizations, and low-income and affordable housing advocates in over
20 twenty states and Canadian provinces, and I have provided expert witness testimony in
21 fourteen of those jurisdictions.

22 I received a B.F.A. from the University of Illinois. My resume, included as
23 Exhibit JG-1, provides additional detail regarding my professional and educational

1 experience.

2 **Q. Have you previously filed expert witness testimony in other proceedings before this**
3 **Commission or before other regulatory commissions?**

4 A. Yes. I filed expert witness testimony before this Commission in Case No. 2017-00097, on
5 behalf of Beverly May, Jim Webb, and Sierra Club. In addition, in the last several years I
6 have filed expert witness testimony in multiple proceedings, including in Virginia, South
7 Carolina, Colorado, West Virginia, Nevada, and Pennsylvania.

8 **Q. What is the purpose of your testimony?**

9 A. The purpose of my testimony is to provide perspective for the Commission on the
10 reasonableness of the approach used by Louisville Gas and Electric Company (“LG&E”)
11 and Kentucky Utilities Company (“KU”) (collectively, the “Companies”) and their
12 consultants in developing the Louisville Gas and Electric Company and Kentucky
13 Utilities Company 2024–2030 Demand-Side Management and Energy Efficiency
14 Program Plan. I will describe flaws and inconsistencies in the Company’s approach and
15 demonstrate that increased levels of energy efficiency (“EE”) and demand response
16 (“DR”) are achievable and in the best interests of the Companies’ customers.

17 **II. SUMMARY OF RECOMMENDATIONS**

18 **Q. Please summarize the Companies’ requests in this proceeding.**

19 A. The primary purpose of the Companies’ application is to request Certificates of Public
20 Convenience and Necessity (“CPCN”) for the construction of two 621 MW net summer
21 rating natural gas combined cycle combustion turbine (“NGCC”) facilities.¹ The

¹ Joint Application of Kentucky Utilities Company and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity and Site Compatibility Certificates and Approval of a Demand Side Management Plan, at 1 (Dec. 15, 2022).

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1 Companies further request approval for the construction of two solar facilities and a
2 battery energy storage system (“BESS”). Along with these requests, the Companies apply
3 for approval of their proposed 2024–2030 Demand-Side Management and Energy
4 Efficiency Program Plan (“DSM-EE Plan” or “Plan”) and related changes to the
5 Companies’ Demand-Side Management Cost Recovery Mechanism tariff sheets,
6 effective January 1, 2024. The focus of my testimony is the DSM-EE Plan that the
7 Companies propose and whether it achieves an appropriate level of energy efficiency on
8 behalf of the Companies’ customers. In particular, I examine the Companies’
9 assumptions and proposals for electric EE and DR, which directly affect their electric
10 resource planning. The Commission and parties should not construe my silence on any
11 issue to imply agreement with the Companies, and I reserve the right to address any
12 issues in the proceeding in future testimony as appropriate.

13 **Q. Please summarize your observations and findings in this case.**

14 A. My observations and findings related to the DSM-EE Plan are as follows:

- 15 1. The DSM-EE Plan has under-pinning in the 2022 Cross-Sector DSM Potential Study
16 Projection (“2022 potential study” or “2022 update”). Cost-effectiveness screening was
17 not updated in the 2022 update, thus it did not reflect appropriate avoided capacity costs,
18 rendering it of little use as a tool for estimating energy efficiency potential;
- 19 2. The potential study only reduced savings potential, but did not consider market trends
20 such as increasing efficiency of heat pumps that could improve cost-effectiveness and
21 lead to more savings for the Companies and their customers;
- 22 3. The Companies’ proposed DSM-EE Plan provides dramatically fewer opportunities for
23 residential customers compared with commercial and industrial customers;

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- 1 4. The Companies propose raising the eligibility threshold for their Income-Qualified
2 Solutions program to 300% of Federal Poverty Level (“FPL”), yet despite increasing the
3 pool of eligible customers, they propose less in the way of annual electric savings for the
4 program than they reported in 2019–2021, and the projected participation does not
5 increase over the 2024–2030 Plan period;
- 6 5. The program selection process was conducted only by the Companies’ staff and
7 consultants, despite the active interest of stakeholders who participated in their DSM
8 Collaborative, and unreasonably eliminated fair consideration of programs, including
9 behavioral, whole house retrofit, and HVAC programs that have been shown to obtain
10 significant levels of savings in other jurisdictions;
- 11 6. The Companies conducted only a superficial analysis of a hypothetical Pay-As-You-Save
12 (“PAYS”) program, resulting in a flawed assessment of the potential value of the
13 program;
- 14 7. The Companies propose to engage customers who purchase smart thermostats of their
15 own volition in demand response programs, but do not articulate an overarching strategy
16 for actively promoting smart thermostats for their value both in demand response and
17 energy efficiency;
- 18 8. The Companies similarly have no apparent strategy for replacing failed switches in their
19 historic direct load control (“DLC”) program, and plan for significant attrition with no
20 active retention strategy for those customers.

21 **Q. Please summarize your recommendations to the Commission.**

22 A. My recommendations are as follows:

- 23 1. Direct the Companies to revise the 2022 update so that the scale and scope of their DSM-

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1 EE programs are not determined on the basis of deeply flawed analyses. In particular, the
2 Companies should be required to re-assess economic potential using avoided energy and
3 capacity costs that reflect future needs;

- 4 2. As one component of the revised 2022 update direct the Companies to conduct a low-
5 income market characterization study to capture demographic data and characteristics of
6 their lower-income customer segment, similar to a Maryland Low-Income Market
7 Characterization Report prepared for the Maryland Office of People’s Counsel in 2018.²
8 Like the Maryland study, the Companies’ market characterization should “furnish data
9 that can be used to understand the energy affordability issues faced by [Kentucky’s] low-
10 income population and to inform the design of existing and future programs.”³ The
11 findings of the study should be used to inform income eligibility criteria and the design,
12 scale, and scope of Income Qualified DSM-EE programs;

- 13 3. The Companies should also conduct a meaningful analysis of comprehensive home
14 retrofit program design opportunities that includes a rationale analysis of PAYS. Rather
15 than the slipshod program design assumptions included in the cursory analysis conducted
16 by Cadmus, the Companies should work to assess the longer-term benefits of a retrofit
17 program that ramps up to a larger number of customers and appropriately spreads startup
18 and administration costs across them;

² Applied Public Policy Research Institute for Study and Evaluation (APPRISE): Maryland Low-Income Market Characterization Report prepared for the Maryland Office of People’s Counsel. October, 2018. <https://opc.maryland.gov/Portals/0/Files/Publications/Reports/APPRISE%20Maryland%20Low-Income%20Market%20Characterization%20Report%20-%20September%202018.pdf?ver=ScReQ-dA9Sk4xlj1V6bp1w%3D%3D>.

³ Applied Public Policy Research Institute for Study and Evaluation (APPRISE): Maryland Low-Income Market Characterization Report prepared for the Maryland Office of People’s Counsel. October, 2018, p.i.

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1 4. Direct the Companies to develop a new 2024–2030 DSM-EE Plan that ramps up over the
2 period to achieve 1.0% gross energy efficiency savings as a percent of 2021 sales by
3 2027 and maintains a similar level of EE savings through 2030. Program level savings
4 should reflect an equitable balance between residential and non-residential savings
5 opportunities consistent with what I provide in Table 8, reproduced here for convenience
6 as Table 1:

7 *Table 1: 2028 Gross EE Savings (Incremental MWh per year) ⁴*

KU-LG&E Proposed	Income-Qualified Solutions	4,405
	Appliance Recycling	6,057
	Residential Online Audit	4,670
	Business Solutions	134,373
EFG Recommended Additional Savings	Proposed additional residential appliances and lighting	-
	Proposed Additional Residential HVAC	5,000
	Proposed Additional Residential whole house-retrofit	8,000
	Proposed Additional Residential new construction	3,165
	Proposed Additional multifamily	5,269
	Proposed Additional Low-income multifamily	1,514
	Proposed Additional Low-income single family	2,265
	Proposed Additional Low-income low-cost	-
	Proposed Additional Residential behavioral	50,000
Proposed Additional Business Solutions	73,738	
Total KU-LG&E Proposed		149,505
Total EFG Recommended Additional Savings		148,951
Total KU-LG&E/EFG Combined Savings		298,456

8
9 5. Direct the Companies to take the required steps to increase combined DLC and Bring-
10 Your-Own Device (“BYOD”) program participation to approximately 250,000 customers
11 in total by 2030. This should be done by proactively enrolling DLC customers in BYOD
12 to counteract expected attrition from the program as switches fail. These customers

⁴ Data for LG&E/KU Proposed from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56.

1 represent a ripe target for continued participation in the Companies' demand response
2 programs and the opportunity to retain them should not be squandered.

- 3 6. To protect customers from the risk of the DSM-EE plan becoming out of date as energy
4 markets change, direct the Companies to file a DSM-EE plan update in 2026, based on a
5 potential study refresh that includes updated avoided costs and re-calculated cost-
6 effectiveness.

7 **III. THE COMPANIES' CASE FOR THEIR DSM-EE PLAN**

8 **Q. Why is it important for the Commission to consider EE/DSM in this proceeding?**

- 9 A. EE programs simultaneously provide both macro and micro benefits to customers: they
10 cost-effectively reduce infrastructure and operations investments the Companies would
11 otherwise need, while also providing a valuable tool for individuals to manage their
12 electricity costs and reduce energy waste. These benefits can be divided into two
13 categories: 1) utility system benefits, consisting of reduced operating and capital costs,
14 which can lead to deferral of associated rate impacts; and 2) customer benefits, consisting
15 of reduced monthly bills that result from the reduction of wasted energy and/or more
16 timely use of electricity. The direct customer benefits provided by EE programs are
17 critically important for those customers who have a high "energy burden."

18 **Q. What do you mean by the term "energy burden"?**

- 19 A. Energy Burden is a term used to quantify the relationship between the cost of household
20 energy use and the household income that is nominally available for paying expenses
21 such as food, rent or mortgage, insurance, medical expenses, energy transportation, and
22 other necessities. Energy burden is calculated by dividing gross household income by
23 energy costs and is expressed as a percentage. Energy burdens above 6% are considered

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1 “high” and above 10% are considered “severe.”⁵ Households with high or severe energy
2 burdens are more deeply affected by energy costs than other households, and because of
3 this, also stand to benefit the most from EE savings. As household income decreases,
4 energy burden increases, such that customers with the least ability to pay are the most
5 harmed by energy waste.

6 **Q. You say these are the “primary” benefits of EE programs. Are there other benefits?**

7 A. Yes. There are numerous additional benefits that enhance the overall value of EE
8 programs, but which may or may not be recognized in cost-effectiveness testing. These
9 can include improved health and safety in homes, such as fewer attacks for people
10 suffering with asthma when moisture issues that lead to mildew and mold growth are
11 addressed as part of building retrofits. There are also benefits to local economies from
12 building trades jobs associated with the building retrofits and the sale and installation of
13 new equipment. Indeed, in a 2018 report, the United States Environmental Protection
14 Agency found that energy efficiency can provide benefits that include “savings in energy
15 and fuel costs for consumers, businesses, and the government; new jobs in, profits for,
16 and tax revenue from companies that support or use energy efficiency and renewable
17 energy, such as construction, manufacturing, and services; and higher productivity from
18 employees and students taking fewer sick days.”⁶

⁵ Ariel Dreihobl et al., *How High are Household Energy Burdens?: An Assessment of National and Metropolitan Energy Burden across the United States*, American Council for an Energy Efficient Economy, at iii (Sept. 2020), <https://www.aceee.org/sites/default/files/pdfs/u2006.pdf>.

⁶ U.S. Env’t. Prot. Agency (“EPA”), *Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments*, at I-7 (2018), https://www.epa.gov/sites/default/files/2018-07/documents/epa_slb_multiple_benefits_508.pdf.

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1 **Q. What is the purpose of EE/DSM in the context of utility resource planning?**

2 A. Utilities in every jurisdiction in which I have worked are required by regulators to
3 provide safe, reliable energy at the lowest cost possible. EE/DSM is a critically important
4 tool for achieving these three fundamental requirements. Energy efficiency reduces the
5 amount of energy utilities need to provide to their customers, and when a utility can
6 invest in energy efficiency at a lower cost than it would take to meet customers' energy
7 requirements through new generation, transmission, and distribution investments and the
8 fuel required to operate those generators, it is considered to be cost-effective. Thus,
9 prudent resource planning must account for and evaluate cost-effective energy efficiency,
10 which provides cost savings to customers in the long term by deferring or eliminating the
11 need for more costly infrastructure investments.

12 **Q. Does EE/DSM also reduce capacity requirements?**

13 A. Absolutely. EE can reduce both energy and capacity needs. Reducing the amount of
14 energy required to operate equipment during periods of peak demand also reduces the
15 capacity requirements during those periods. And demand response ("DR") is specifically
16 devised to reduce the operation of equipment during high demand periods, thus further
17 reducing capacity requirements.

18 **Q. Does energy efficiency provide any safety or reliability benefits?**

19 A. Yes. In addition to the health benefits that come with improved building shell efficiency
20 and modern, high efficiency equipment, energy efficiency is a reliable resource that is not
21 subject to outages and variable fuel costs. What is more, efficient buildings are able to
22 maintain safe indoor temperatures for a longer period of time when extreme weather

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1 events cause power system disruptions.⁷ Benefits such as these, in addition to the bill
2 saving benefits energy efficiency provides, are more reasons why the Companies should
3 dramatically increase their commitment to higher levels of energy efficiency.

4 **Q. Why are the Companies filing an update to their DSM-EE Plan at this time?**

5 A. The Companies state they have filed “a mid-plan adjustment to request approval for
6 additional budget and programs to support a substantive increase in their portfolio
7 offerings that will make more comprehensive energy efficiency and demand response
8 opportunities available to a broader customer population.”⁸ They indicate that the
9 adjustment would result in roughly triple the level of annual investment from \$15 million
10 to \$45–\$50 million, would increase the 7-year cumulative MW savings from EE by 2030
11 from 112 MW to 170 MW, and would more than double the demand response savings
12 available in 2030 from 86 MW to 207 MW.⁹

13 **Q. Are there specific changes in the Companies’ operating environment that have**
14 **prompted them to file the adjusted Plan?**

15 A. Yes. The Companies state that they “anticipate retiring large amounts of coal-fired
16 generation capacity in the near future. As a result, the Companies’ avoided cost of
17 capacity has significantly increased since the Companies’ most recent DSM-EE Program

⁷ See, e.g., Urban Green Council, *Baby It’s Cold Outside* (Feb. 2014), <https://www.urbangreencouncil.org/wp-content/uploads/2022/11/2014.02.05-Baby-Its-Cold-Inside.pdf> and Sneha Ayyagari et al., *Hours of Safety in Cold Weather: A Framework for Considering Resilience in Building Envelope Design and Construction*, Rocky Mountain Inst. (Feb. 2020), <https://rmi.org/wp-content/uploads/2020/02/Hours-of-Safety-insight-brief.pdf>.

⁸ Direct Testimony of John Bevington, In re Electronic Joint Application of Kentucky Utilities Company and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity and Site Compatibility Certificates and Approval of a Demand Side Management Plan, Case No. 2022-00402, Exhibit JB-1 at 2 (Dec. 15, 2022) (“Bevington Direct”).

⁹ Bevington Direct at 3, line 7.

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1 Plan filing. This avoided cost change positively impacts the cost-effectiveness of certain
2 DSM-EE programs and allows the Companies to now seek approval for an expanded
3 DSM-EE Program Plan that is cost-effective.”¹⁰

4 **Q. What steps did the Companies take in developing their proposed adjustment of the**
5 **approved 2019–2025 DSM-EE plan for 2024–2030?**

6 A. The Companies state that based on “an anticipated possible future capacity need and the
7 evolving and increasing avoided cost of capacity”¹¹ they “surveyed their DSM-EE
8 Advisory Group in 2021 to solicit input for developing new and updated DSM-EE
9 programs.”¹² They also commissioned the Cadmus Group, Inc. (“Cadmus”) “to perform
10 a demand response potential study in the first quarter of 2021,”¹³ and in the latter half of
11 2022, they “met with the DSM-EE Advisory Group on five different occasions and
12 updated their DSM-EE potential studies for residential, commercial, and industrial
13 customers.”¹⁴

14 **Q. What specific adjustments have the Companies proposed in their 2024–2030 Plan?**

15 A. First, the Companies propose “to continue and expand upon the WeCare Program to
16 serve the low-income population and to offer similar benefits to qualifying multi-family
17 housing; indeed, the Companies are proposing to make their Income-Qualified Solutions
18 one of the most highly funded DSM-EE programs.”¹⁵ The Companies also propose to

¹⁰ *Id.* at 5, lines 19–24.

¹¹ *Id.* at 6, lines 6–7.

¹² *Id.* at 6, lines 11–13.

¹³ *Id.* at 6, lines 9–10.

¹⁴ *Id.* at 6, lines 17–19.

¹⁵ *Id.* at 13, lines 4–8.

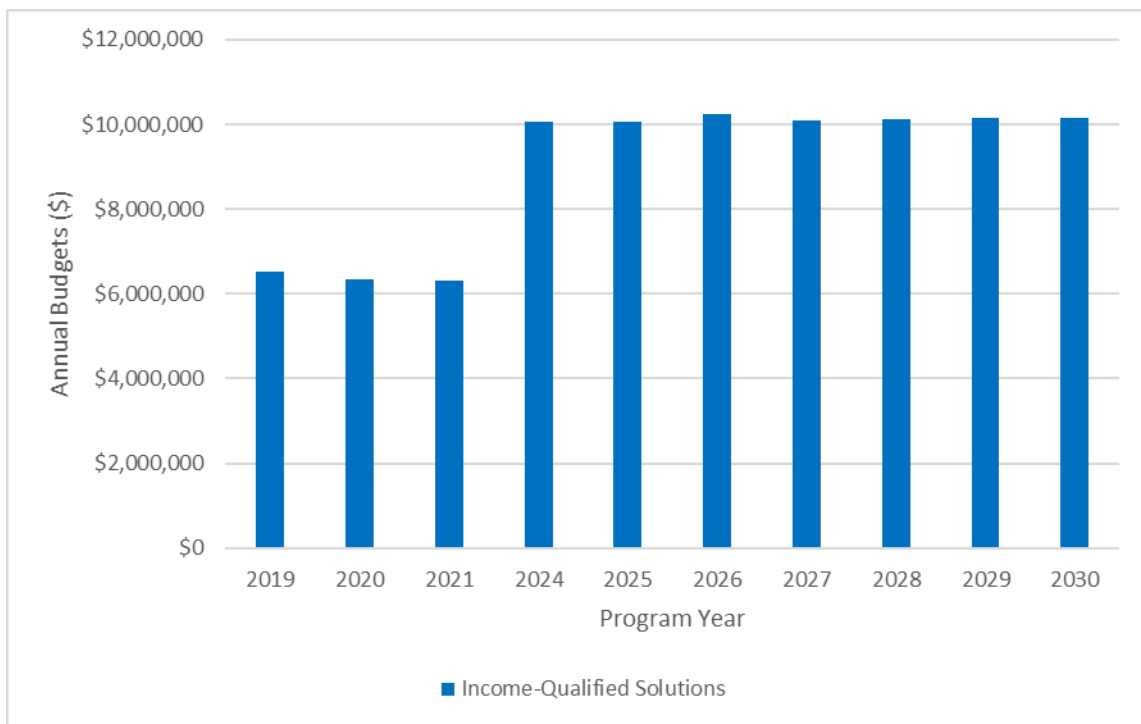
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1 expand eligibility for Income-Qualified Solutions to households with annual incomes less
2 than or equal to 300% of FPL.¹⁶

3 **Q. How do the electric savings and program budgets for Income-Qualified Solutions**
4 **compare with the current WeCare program?**

5 A. The Companies proposed increased budgets for Income-Qualified Solutions, as seen in
6 Figure 1, however it is not clear what they will accomplish with these increased budgets.

7 *Figure 1: Income Qualified Solutions Proposed Budgets¹⁷*



8
9 The proposed annual electric savings for 2024–2030 appear to be around 10% less than

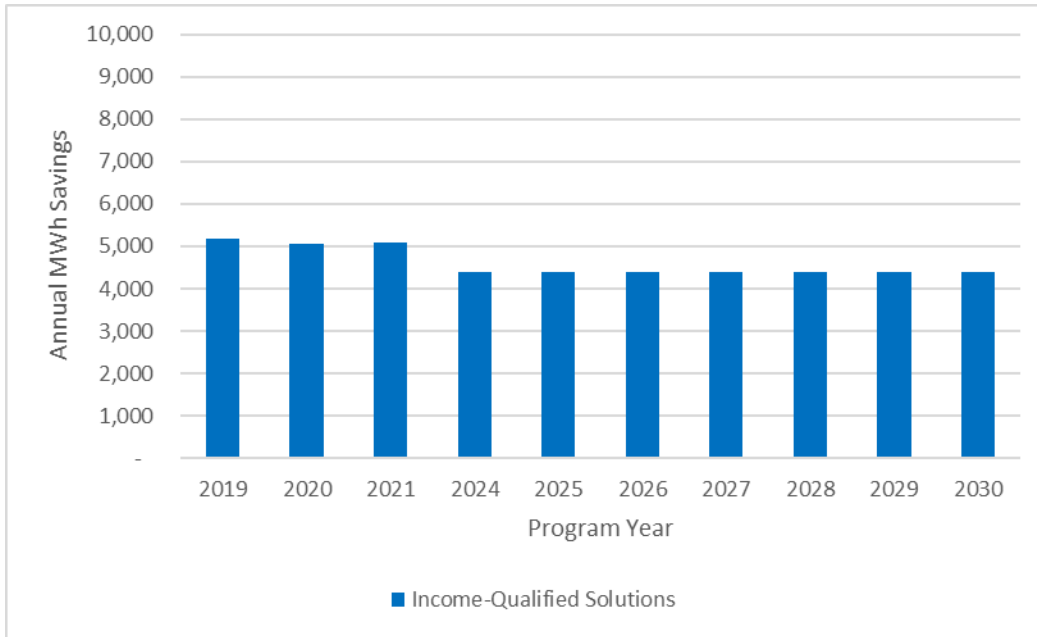
¹⁶ Direct Testimony of Lana Isaacson, In re Electronic Joint Application of Kentucky Utilities Company and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity and Site Compatibility Certificates and Approval of a Demand Side Management Plan, Case No. 2022-00402, at 6, lines 7–8 (Dec. 15, 2022) (“Isaacson Direct”).

¹⁷ 2019–2021 costs from Isaacson Direct, Exhibit LI-6 – Public\Granular Files\Data Companies Provided to Cadmus\EE – Financial Actuals – DSM 2022; 2024–2030 budgets from Bevington Direct, Exhibit JB-1, Tbl. 3-3. Income-Qualified Solutions Annual Budget, at 29.

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1 what the Companies indicate they achieved in 2019–2021, as illustrated in Figure 2.

2 *Figure 2: Historic and Proposed Income-Qualified Solutions Savings¹⁸*



3
4 This does not seem consistent with the Companies’ statement that it proposes to

5 expand the successful WeCare program in a number of meaningful ways
6 to reach more customers, including expanding the eligibility to serve
7 customers who are at or below 300% of the federal poverty level,
8 including a smart thermostat direct install measure, using publicly
9 available data to better target eligible customers, promoting the program
10 services in high-need areas, and increasing the overall average allowable
11 measure cost per single-family home to a larger group of eligible
12 customers.¹⁹

13 **Q. In what way does the Companies’ statement not seem consistent with the projected**
14 **savings?**

15 **A. By increasing the income limit to 300% FPL, logically, many more customers should be**

¹⁸ 2019–2021 savings from Isaacson Direct, Exhibit LI-6 – Public\Granular Files\Data Companies Provided to Cadmus\EE – Energy Actuals 2022; 2024–2030 savings from Bevington Direct, Exhibit JB-1’ Table 3-2 at 28, Income-Qualified Solutions Annual and Cumulative Energy and Demand Impacts.

¹⁹ Isaacson Direct at 6, lines 14–20.

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1 eligible to participate. Given this, it would be reasonable to expect the Companies to
2 perform an analysis about what the pool of eligible customers might be when they
3 propose such a change. However, in response to discovery, the Companies state they “do
4 not track income data for customers”²⁰ and thus do not know how many customers are
5 eligible at either the 200% FPL or 300% FPL eligibility level. However the evaluation of
6 the WeCare program indicates some awareness of the Census data which the Companies
7 could further explore.²¹

8 **Q. Are you aware of publicly available information the Companies could use to**
9 **estimate the number of customers’ households that are eligible for the Income**
10 **Qualified Solutions at either 200% or 300% of FPL?**

11 A. Yes, at least in part. There are readily available estimates of the number of households at
12 a variety of income levels by county and state, as well as estimates of relative energy
13 burdens produced annually by Fisher, Sheehan, and Colton.²² The data indicate that in
14 2022 there were roughly 612,000 households in Kentucky state-wide with annual
15 incomes below 200% FPL. In very rough terms, if the Companies’ percentage of
16 households with incomes at or below 200% FPL is consistent with its percentage of total
17 residential electric accounts²³ it would suggest that somewhere around 240,000 of the

²⁰ Response of Kentucky Utilities Company & Louisville Gas & Electric Company to Joint Intervenors’ First Supplemental Discovery Requests, Questions 11(a) and 11(b) (May 4, 2023) (“LGE & KU Response to JI First Supplemental Q”).

²¹ Response of Kentucky Utilities Company & Louisville Gas & Electric Company to Joint Intervenors’ Initial Request for Information, Question 140, Attachment 5 at 14 (Mar. 10, 2023) (“LGE & KU Response to JI Initial Q”).

²² Fisher, Sheehan & Colton, *The Home Energy Affordability Gap*, www.homeenergyaffordabilitygap.com (last visited July 11, 2023).

²³ U.S. Energy Information Administration Form EIA 861 (2021) (“2021 EIA 861”) “Sales_Ult_Cust_2021” file data show a total of 2,007,153 residential accounts in Kentucky in 2021, as

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1 Companies' customers have incomes below 200% FPL. Of course, this is a crude
2 estimate, and it might be more accurate to consider these data on a county basis, looking
3 only at the counties served by the Companies, rather than the state as a whole.

4 **Q. Are there any publicly available data showing how many households fall between**
5 **200% FPL and 300% FPL?**

6 A. I am not aware of any such data specifically, though the American Community Survey
7 ("ACS") data, available for individual states from the United States Census is similarly
8 informative.²⁴ For example, ACS estimates the number of Kentucky households with
9 incomes below \$10,000, between \$10,000 and \$14,999, and so on.²⁵ 200% of FPL in
10 2023 for a family of four is \$60,000, and 300% is \$90,000.²⁶ While we do not know the
11 household size that is correlated with the reported incomes, there seems to be roughly a
12 13% increase from the number of households with incomes around 200% FPL to the
13 number with incomes around 300% FPL. This would suggest the Companies have
14 something like 32,000 additional customers between 200% FPL and 300% FPL.

15 **Q. How should the Companies use the estimate you provide here?**

16 A. My rough calculation above is intended only to illustrate that by increasing the income
17 threshold, more customers will become eligible – and that it is probably not a trivial

well as 441,872 for Kentucky Utilities Co. and 375,455 for Louisville Gas & Electric, thus the Companies had 40.7% of the residential accounts in the state in 2021.

²⁴ U.S. Census Bureau, Data portal (last revised June 6, 2023), <https://www.census.gov/data.html> or <https://data.census.gov/>.

²⁵ U.S. Census Bureau, ACS Table: S1901 Earnings In The Past 12 Months (In 2021 Inflation-Adjusted Dollars) (2021), [https://data.census.gov/table?t=Income+\(Households,+Families,+Individuals\)&g=040XX00US21](https://data.census.gov/table?t=Income+(Households,+Families,+Individuals)&g=040XX00US21).

²⁶ Dep't of Health & Human Servs., *Annual Update of the HHS Poverty Guidelines*, 88 Fed. Reg. 3424 (Jan. 19, 2023), <https://www.federalregister.gov/documents/2023/01/19/2023-00885/annual-update-of-the-hhs-poverty-guidelines>, showing incomes at 100% of FPL.

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1 number of additional customers. I understand that this is not a precise number. However,
2 it could be meaningful as a back-of-the-envelope method for estimating how much larger
3 the pool of income-qualified customers might be if the income threshold is raised to
4 300% FPL, and for determining the budget that would be required to ensure that a
5 reasonable number of customers are reached and that they are provided with
6 comprehensive savings opportunities. For comparison, when Maryland's Department of
7 Housing and Community Development proposed to increase the income qualification
8 threshold from 200% FPL to 250% FPL, it estimated that 115,000 more households
9 would become eligible, in addition to the 450,000 households already eligible at 200%
10 FPL.²⁷ The key takeaway here is that increasing the income eligibility may be warranted,
11 but it needs to be accompanied by an understanding of the impact the change would have,
12 and the program needs to be appropriately funded to address the increase.

13 **Q. Is there a more detailed approach the Companies should use to better inform their**
14 **Income-Qualified Solutions program planning?**

15 A. Yes. I mentioned earlier that the Maryland Office of People's Counsel had commissioned
16 a low-income market characterization to provide an analytic basis for understanding low-
17 income ratepayers in that state. These data are now used to inform program
18 implementation planning for EmPOWER Maryland. The report is, of course, far more
19 detailed and meaningful than the simple back of the envelope calculation I provide as an
20 illustration. I recommend the Commission direct the Companies to conduct a similar

²⁷ Md. PSC, In the Matter of the EmPOWER Maryland 2018–2020 Energy Efficiency, Conservation and Demand Response Program Plans Pursuant to the EmPOWER Maryland Energy Act of 2008, DHCD 2021–2023 EmPOWER Maryland Limited Income Program Plan (ML#231674), Case No. 9494, at 32, 24 (Aug. 31, 2020).

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1 market characterization of their low-income customers and that the scale and scope of the
2 Income-Qualified Solutions program be based on rigorous data analyses.

3 **Q. What level of participation do the Companies project for their Income Qualified**
4 **Solutions program?**

5 A. The Companies indicate they expect 5,390 participants in each year of the proposed
6 DSM-EE Plan.²⁸ Of these, 800 are expected for the Whole Building Multifamily
7 component of the program.²⁹ These projections are somewhat larger than the actual
8 participation reported in PY2020 (4,006) and PY 2021 (4,000).³⁰ However, even at
9 roughly 5,400 participating households per year, the Companies would only reach
10 something like 2% of their eligible customer households with incomes below 300% FPL.

11 **Q. Do the Companies propose to increase the savings the Income-Qualified Solutions**
12 **program achieves?**

13 A. No. In fact the opposite is true, as illustrated in Figure 2 above, despite steps the
14 Companies propose to “uncover deeper energy savings.”³¹ If more customers participate
15 and the savings per participant stays the same (or increases), the overall program savings
16 should also increase – but that is not what the Companies project. Instead, total program
17 savings remain relatively flat, meaning that expanded eligibility will not have any real
18 positive effect in aggregate, though it may provide benefits to participating households. A
19 significantly increased Income-Qualified program budget should provide more benefits,

²⁸ Bevington Direct, Exhibit JB-1 at 54, Table A-2. Income-Qualified Solutions Impacts and Costs by Year, 2024–2030 (Years 1–7) participants.

²⁹ *Id.* at 27, Table 3-1. Income-Qualified Solutions Participation Goals, 2024–2030 (Years 1–7) participants.

³⁰ Attachment 5 at 12, LGE & KU Response to JI Initial Q140.

³¹ Bevington Direct, Exhibit JB-1 at 25.

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1 and increasing the income eligibility threshold should only be approved if the Companies
2 demonstrate how doing so will increase access to energy savings for the eligible
3 population, generally, while also ensuring that the most vulnerable customers are
4 prioritized.

5 **Q. Is it reasonable for the Companies to expand eligibility in the Income-Qualified**
6 **Solutions program?**

7 A. It may be reasonable, but only if it is based on understanding the characteristics of the
8 market they are seeking to reach, and if a plan and accompanying budget are developed
9 that reflect that need and opportunity. There is a risk that expanding the income threshold
10 will decrease participation among the Companies' lowest-income households if overall
11 participation is not increased, and if participation among those most vulnerable customers
12 is not actively monitored, tracked, and encouraged by the Companies.

13 **Q. What else do the Companies propose to adjust in their DSM-EE implementation?**

14 A. The Companies propose to re-start an appliance recycling program "in 2026 to allow time
15 for program ramp up, because it is conducive to customer expectations and achieves cost
16 effective energy and demand savings."³² The program "seeks to target removal and
17 recycling of refrigerators, freezers, room air conditioners, and dehumidifiers."³³ This
18 type of program has been widely implemented in other jurisdictions and was previously
19 implemented by the Companies. I think that appliance recycling is a reasonable program
20 as part of a well-considered suite of programs whose benefits are available to a wide
21 range of customers. However, I will also note that the proposed two-year ramp-up for this

³² Bevington Direct, Exhibit JB-1 at 30.

³³ Id.

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1 program is excessive. The Commission should expect the Companies to launch the
2 program within six months of approval, or in any case no later than January 1, 2025.

3 **Q. Are there other changes proposed by the Companies?**

4 A. Yes. The Companies also propose to implement a web-based online audit program for
5 residential customers that “pulls customer-specific interval data from the Companies’
6 advanced metering infrastructure (“AMI”) to provide an accurate picture of the
7 customer’s disaggregated energy use.”³⁴ This will be used to provide customers with
8 “feedback on their energy-use behavior, energy-saving tips, and recommendations,”³⁵ as
9 well as “a kit including energy efficiency measures for self-installation,”³⁶ and “access to
10 prescriptive rebates received from the installation of energy efficient measures in the
11 home.”³⁷

12 **Q. Will the online audit program be similar in effect to a more traditional in-home
13 retrofit audit program?**

14 A. No. The program may be able to engage some segment of motivated customers to install
15 more comprehensive measures through the prescriptive rebates it offers, but my
16 experience suggests it will not be likely to effectively support customers to install
17 comprehensive home energy efficiency improvements such as insulation and air leakage
18 reductions. Effective home energy efficiency retrofits require knowledgeable installers
19 and a building science-based approach. In addition, the informational benefit of engaging
20 with a knowledgeable auditor in a customer’s home, and the project facilitation that is

³⁴ Isaacson Direct at 7, lines 21–23.

³⁵ *Id.* at 8, lines 1–2.

³⁶ *Id.* at 8, lines 2–3.

³⁷ *Id.* at 8, lines 3–5.

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1 integral to successful comprehensive home retrofit programs and PAYS are hard to
2 replace with a web-based approach. That is not to say that the program will not provide
3 benefits – only that in my view, it likely will not be sufficient to engender the types of
4 larger-scale EE retrofits that would meaningfully benefit participating customers and
5 should not be viewed as a substitute for a more traditional in-home retrofit audit program.

6 **Q. Do the Companies also propose to adjust the non-residential programs?**

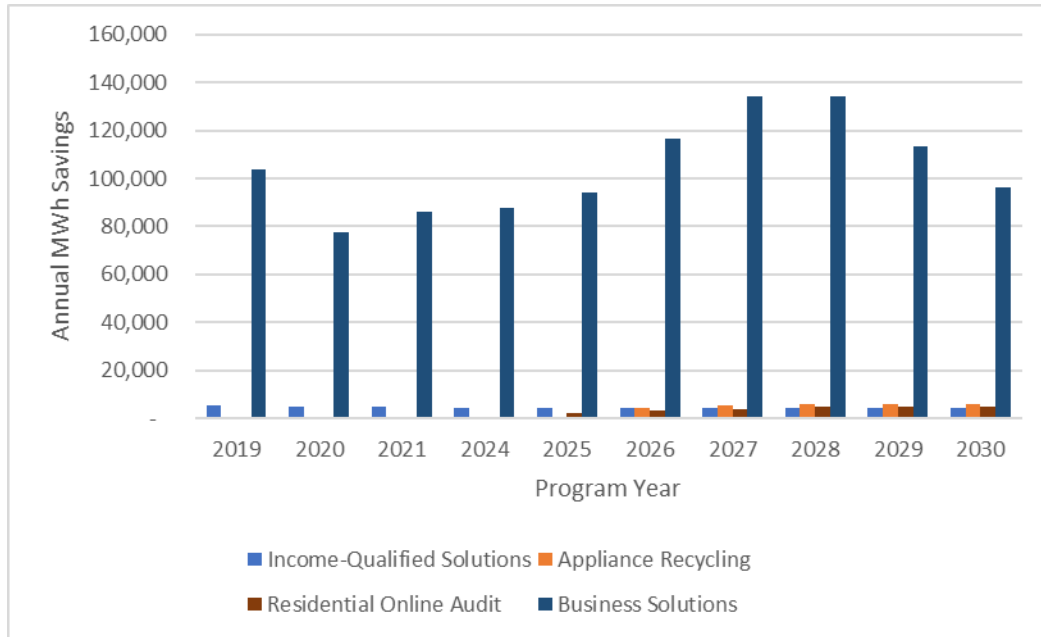
7 A. Yes. The Companies propose to implement three non-residential programs under the
8 banner of “Business Solutions.” The three sub-programs include “Nonresidential
9 Rebates, Small Business Audit and Direct Install, and Nonresidential Midstream
10 Lighting.”³⁸ These are common program types that are found in many utility EE
11 portfolios. The Companies propose that the lion’s share of EE savings in the Plan will
12 come from these non-residential programs as shown in Figure 3.

³⁸ *Id.* at 8, lines 9–11.

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1

Figure 3: Residential vs. Non-Residential EE Savings³⁹



2

3 **Q. Is it reasonable for the Companies to favor savings so heavily from their non-**
4 **residential customers?**

5 A. Not at all, and this is a fundamental concern I have with the Plan as proposed. The
6 Companies state that they “iteratively adjusted each program’s expected participants and
7 customer incentive levels as needed to balance the DSM/EE Program Plan. The goal was
8 to provide a reasonable mix of programs that meet the Companies’ objectives for a
9 comprehensive plan with robust programmatic options for all customer sectors and
10 segments.”⁴⁰ I do not believe that their plan achieves that goal. In particular, I do not
11 believe that it would be apt to describe the Online Audit and Appliance Recycling

³⁹ 2019–2021 savings from Isaacson Direct, Exhibit LI-6 – Public\Granular Files\Data Companies Provided to Cadmus\EE – Energy Actuals 2022, tab “Actuals” columns CA, CB, and CC ; 2024–2030 (Years 1-7) savings from Bevington Direct, Exhibit JB-1 at 54–55, Table A-2. Income-Qualified Solutions Impacts and Costs by Year; Table A-3. Appliance Recycling Impacts and Costs by Year; Table A-4. Residential Online Audit Impacts and Costs by Year; Table A-5. Business Solutions Impacts and Costs by Year.

⁴⁰ Bevington Direct, Exhibit JB-1 at 11.

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1 programs as “robust programmatic options” for residential customers. To further
2 illustrate the data in Figure 3, Table 2 shows that in 2028, when the programs as proposed
3 are fully ramped up, non-income qualified residential customers are slated to receive only
4 4.1% of total portfolio MWh savings from Appliance Recycling and 3.1% of total
5 portfolio MWh savings from Residential Online Audit, while income-qualified residential
6 customers can only expect to receive 2.9% of the total portfolio MWh savings, and
7 Business Solutions customers will get nearly 90% of the total savings. I would not call
8 this a balanced portfolio with respect to savings opportunities.

9 *Table 2: Program Budgets and Savings % of Total (2028)⁴¹*

	2028 (MWh)	% of Total Savings	2028 (\$000)	% of Total Budget
Income-Qualified Solutions	4,405	2.9%	\$ 10,123	45.7%
Appliance Recycling Program	6,057	4.1%	\$ 1,926	8.7%
Residential Online Audit Program	4,670	3.1%	\$ 1,681	7.6%
Business Solutions	134,373	89.9%	\$ 8,400	38.0%
Total Portfolio Budget	149,505		\$ 22,130	

10
11 Table 2 also shows that the Companies propose comparatively small annual budgets for
12 the two residential programs that would be available for customers who are not eligible
13 for the Income-Qualified Solutions.

14 **Q. How do the proposed levels of program investment and savings compare with what
15 other utilities have achieved?**

16 A. In comparison with other utilities’ DSM-EE savings and investments, the Companies
17 rank poorly. This is true not only when comparing recent past performance where small
18 savings would be expected based on the Companies’ limited program offerings, but also

⁴¹ Data from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56.

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1 when comparing the Companies’ proposed program savings and investment levels with
2 the recent results obtained by other large utility EE programs. For simplicity, I calculated
3 and compared the Companies’ proposed savings and investments to the reported 2018
4 savings and investments of fifty-two large investor-owned utilities (“IOUs”) that were
5 included in an analysis by the American Council for an Energy Efficient Economy
6 (“ACEEE”). Two of the primary metrics considered by ACEEE are net savings as a
7 percent of MWh sales and program spending as a percent of utility revenue. I calculated
8 these values for each year of the Companies 2024–2030 Plan, using 2021 revenues and
9 MWh sales as reported by EIA.

10 **Q. What scores would the Companies have received if they were included in the**
11 **ACEEE analysis?**

12 A. ACEEE awards up to 8.0 points in the category of net savings as a percent of sales, and
13 by my calculation the Companies propose to achieve on average for 2024–2030 net
14 savings equal to 0.35%⁴² of their 2021 MWh sales, which would result in receiving 1 out
15 of the possible 8 points for the level of savings it proposes to achieve in 2024–2030. This
16 would mean that forty of the fifty-two utilities ranked by ACEEE received more points
17 than the Companies would.

18 **Q. How would the Companies score in the category of program spending?**

19 A. Unsurprisingly, the result is similar. On average, the 2024–2030 EE budget is 0.76% of

⁴² Average gross annual Plan savings of 122,647 MWh calculated from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56. Net savings calculated using net-to-gross of 0.831 as used by ACEEE in its calculations. 2021 EIA 861, “Sales_Ult_Cust_2021” file data show LGE & KU electric sales of 28,761,592 MWh.

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1 annual revenue,⁴³ which would earn 0.5 points out of a possible 7. For this metric, forty-
2 three of the fifty-two large IOUs considered by ACEEE ranked higher. Notably, AEP
3 Ohio in 2018 had nearly three times the annual savings proposed by LGE & KU as a
4 percent of sales and three times the annual program spending as a percent of revenues.⁴⁴
5 Simply put, the Companies are obtaining far, far less savings for their Kentucky
6 customers than comparable utilities across the country.

7 **Q. What do the Companies claim provides a basis to support the level of savings they**
8 **propose?**

9 A. The Companies state that the “[p]roposed DSM-EE Program Plan will allow the
10 Companies to reach their program DSM-EE potential”⁴⁵ as identified in the potential
11 study, however, there are fundamental flaws in the study that render this conclusion
12 meaningless. I believe the Companies have far more achievable potential than the study
13 indicates and, as a result, far more than they have included in their DSM-EE plan.

14 **IV. THE COMPANIES’ FLAWED APPROACH TO ESTIMATING POTENTIAL**

15 **Q. How did the Companies determine their estimate of the achievable DSM-EE**
16 **potential in their service territories?**

17 A. The Companies commissioned Cadmus to both update “their energy efficiency potential

⁴³ Average annual Plan budgets of \$21,138,981, including allocated Program, Development, & Administration calculated from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56. 2021 EIA 861 shows LGE & KU electric revenues of \$2,773,473,700 from.

⁴⁴ Grace Relf et al., *2020 Utility Energy Efficiency Scorecard, Report U2004*, Am. Council for an Energy Efficient Econ., at 26, 28 (Feb. 2020) (Table 8: Scores for net savings as a percentage of retail sales in 2018), (Table 10: Scores for spending as a percentage of revenue in 2018), https://www.aceee.org/sites/default/files/pdfs/u2004%20rev_0.pdf (“2020 Utility EE Scorecard”).

⁴⁵ Isaacson Direct at 5, lines 17–18.

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1 studies to reflect current market conditions”⁴⁶ (the 2022 potential study⁴⁷ or “2022
2 update”) and to “perform a demand response potential study in the first quarter of
3 2021.”⁴⁸ However, the 2022 update of the EE potential and the process used by the
4 Companies to determine which programs to include in subsequent analysis are both
5 deeply flawed – so much so that the Companies’ estimate of achievable potential is
6 wildly out of step with the achievements of other utilities.

7 **Q. In what way is the 2022 potential study flawed?**

8 A. The most fundamental flaw is that the “analysis did not entail a measure or fuel cost
9 update or cost-effectiveness model re-run.”⁴⁹ This is shocking, because the 2017 Study
10 assessed cost-effectiveness using a \$0.00 capacity avoided cost, whereas the Companies
11 estimated avoided capacity cost in the instant case is \$136.20.⁵⁰ So, despite the
12 Companies’ statement that the “avoided cost of capacity has significantly increased since
13 the Companies’ most recent DSM-EE Program Plan filing [which] positively impacts the
14 cost-effectiveness of certain DSM-EE programs,”⁵¹ they did not reflect the current
15 avoided capacity costs when determining economic or achievable potential in the 2022
16 update. Given this, the Companies’ finding that the savings from the proposed 2024–
17 2030 DSM-EE Program Plan “are consistent with the numbers identified as achievable
18 from the most recent potential studies and updates by Cadmus”⁵² is a meaningless

⁴⁶ Bevington Direct, Exhibit JB-1 at 3.

⁴⁷ *Id.*, Appendix D.

⁴⁸ *Id.* at 6, lines 9–10.

⁴⁹ *Id.*, Appendix D at 2.

⁵⁰ LGE & KU Response to JI First Supplemental Q28(b).

⁵¹ Bevington Direct at 5, lines 20–24.

⁵² *Id.* at 12, lines 21–23.

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1 comparison.

2 **Q. Would the failure to update cost-effectiveness testing affect the amount of economic**
3 **and achievable potential?**

4 A. Yes. “Economic potential” represents a “subset of technical potential, comprising only
5 measures meeting cost-effectiveness criteria based on the Companies’ avoided supply
6 costs for delivering electricity and natural gas and for avoided line losses.”⁵³ Generally,
7 not all efficiency measures that are identified as technically possible will also be cost
8 effective, so that economic potential is almost always somewhat less than technical
9 potential, but how much less depends entirely on the assumptions used in the analysis,
10 including the avoided costs.

11 **Q. Is there a “typical” reduction in potential in the process of screening technical**
12 **potential for cost-effectiveness to determine economic potential?**

13 A. The amount of technical potential that is cost effective depends to a large degree on the
14 avoided costs that are used, as well as the estimated measure costs and savings. Lower
15 avoided costs tend to result in a smaller amount of economic potential. However, I was so
16 struck by the amount of the reduction in the Companies’ 2017 potential study that used
17 \$0 capacity avoided costs, that I compared those findings with several other studies that I
18 am aware of,⁵⁴ including a 2021 potential study conducted by Cadmus for Consumers
19 Energy, and the Dominion Energy Virginia 2021 potential study conducted by DNV that
20 Cadmus highlighted as a validation for its findings.⁵⁵ Table 3 shows that for the potential

⁵³ Bevington Direct, Appendix D at 2.

⁵⁴ It is important to note that I did not conduct an exhaustive search for other potential studies – my review is meant only to be illustrative.

⁵⁵ Bevington Direct, Appendix D, at 9.

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1 studies included in this comparison, on average economic potential was found to be about
2 82% of technical potential. In comparison, the 2017 Cadmus study for LGE & KU found
3 that only 28% of technical potential was economic. Put simply, Cadmus found that only
4 one third as much potential passed cost-effectiveness testing for LGE & KU as did on
5 average for six other studies.

*Table 3: Comparison of Technical and Economic Potential
(Incremental MWh Savings)*

	Technical	Economic	Economic % of Technical	Study Firm
Ameren IL 2020	12,426,726	10,848,372	87%	GDS
IN-MI Power 2016	3,957,000	3,165,000	80%	AEG
Dominion VA 2021	23,428,000	10,732,000	46%	DNV
EmPOWER MD 2023	5,242,000	4,434,000	85%	AEG
Vectren IN 2019	1,400,000	1,240,000	89%	GDS
Consumers MI 2021	10,527,202	10,333,188	98%	Cadmus
Average: Economic as a % of Technical			82%	
KU-LG&E 2017	7,072,000	1,988,000	28%	Cadmus

8
9 **Q. Does this result make sense given the 2017 study use of \$0.00 avoided costs for**
10 **capacity?**

11 A. Perhaps. It certainly would not be surprising that there would be less economic potential
12 because of the \$0 capacity costs in the 2017 study than the other studies found– but this
13 only highlights why it is such a concerning problem that cost-effectiveness was not re-
14 calculated in the 2022 update. In the update, Cadmus states that “the overall economic
15 potential values reflect the same percentage changes applied to technical potential
16 values”⁵⁶ in the 2016 and 2017 studies where \$0 capacity avoided costs constrained the
17 economic potential. In other words, Cadmus assumed the same precipitous drop in

⁵⁶ *Id.* at 2.

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1 economic potential that it calculated using \$0 capacity costs in the previous study. The
2 Companies and Cadmus are validating their 2022 potential study against the previous
3 studies that are inconsistent with the current capacity need. This makes no sense and
4 leads to fatally skewed results.

5 **Q. You say that Cadmus highlighted the Dominion Energy Virginia 2021 potential**
6 **study as validating its findings for the Companies. Did Cadmus look at any other**
7 **potential studies?**

8 A. No. In response to discovery asking the Companies to “list each additional state or
9 territory that the...study results were compared to,” they responded, “[n]o other state was
10 used.”⁵⁷ In other words, they validated their findings using a single data source when
11 many are available. This is surprising considering that Cadmus itself conducts potential
12 studies for other jurisdictions such as the Consumers MI study included in my table
13 above and should have easy access to those results.

14 **Q. Are there other flaws in the 2022 update?**

15 A. Yes. An additional flaw is the failure of Cadmus to “include a complete measure
16 characterization review, so increases in high-efficiency equipment standards, such as
17 changes in ENERGY STAR® specification requirements or the inclusion of new highest
18 efficiency or emerging technologies since the 2016 and 2017 studies were not accounted
19 for in this analysis.”⁵⁸ Cadmus concludes that “technical potential has declined by
20 approximately 12% over the 20-year study horizon,”⁵⁹ apparently, without fully

⁵⁷ LGE & KU Response to JI First Supplemental Q145(b).

⁵⁸ Bevington Direct, Appendix D at 2.

⁵⁹ *Id.* at 1.

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1 considering the effect of rapidly improving technologies, such as cold climate heat pumps
2 (“CCHP”) that can meet winter heating needs without relying on electric resistance
3 backup heat. Cadmus seems to have unreasonably focused on updating factors that would
4 decrease efficiency, while neglecting emerging opportunities that could increase it.⁶⁰

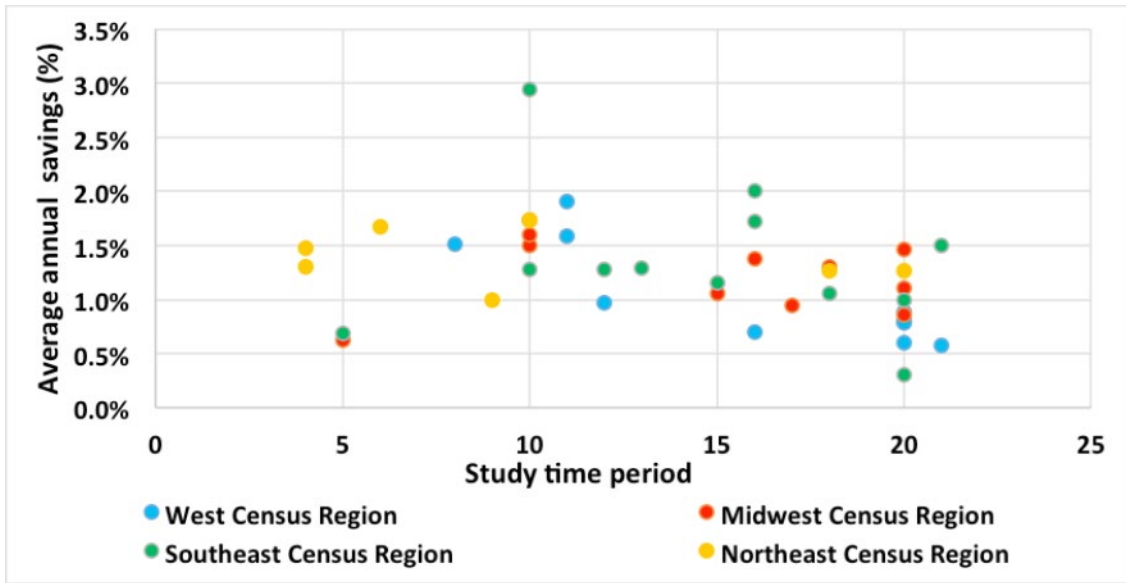
5 **Q. If these errors were corrected, including re-calculating cost-effectiveness using up-**
6 **to-date avoided costs, would it change the results of the 2022 update?**

7 A. Definitely. But even then, the estimated potential would almost certainly be less than
8 what the Companies could actually achieve if they were given clear regulatory direction
9 to pursue aggressive program implementation. And the idea that the LGE & KU service
10 territories have uniquely less EE potential than other parts of the country does not hold
11 water. An ACEEE analysis of forty-five potential studies found, by analyzing “the
12 relationship between savings and study time period, savings and census region (to assess
13 possible geographical differences), savings and participation rates, and savings and
14 avoided costs. . . [that] [i]t does not appear that savings vary by geography: there was
15 equal representation across the country for a given level of savings.”⁶¹ This is illustrated
16 in Figure 4 below, in which the data points are shown in different colors to indicate the
17 region of the country that is represented by each study. If the potential studies estimated
18 different results largely based on region, then the dots of each color representing a
19 different region would be clustered together – but instead they are scattered without
20 respect to geographic location:

⁶⁰ Cadmus states that it did make adjustments for “technical feasibility” constraints, *id.*, Appendix D at 3, but this is different than updating measure characterizations.

⁶¹ Max Neubauer, *Cracking the TEAPOT: Technical, Economic, and Achievable Energy Efficiency Potential Studies*, Report U1407, Am. Council for an Energy Efficient Econ., at v (Aug. 2014), <https://www.aceee.org/research-report/u1407> (“Neubauer Report”).

1 *Figure 4: Average annual electricity savings (%), by census region, reproduced from ACEEE*⁶²
2



3
4 **Q. Why do you believe that even with the recommended corrections, the potential**
5 **study would still underestimate what the Companies could achieve?**

6 A. This limitation of potential studies is well-documented. ACEEE, the Regulatory
7 Assistance Project, Lawrence-Berkeley National Laboratory, and others have all studied
8 how well potential study estimates correlate with future results.⁶³ ACEEE, for example,
9 reviewed “45 publicly available studies published since 2009” with the intent to “better
10 understand the nuts and bolts of these studies and how their various methodological

⁶² *Id.* at 30 (Figure 4: Average annual electricity savings (%), by census region).

⁶³ See, e.g., David B. Goldstein, *Extreme Efficiency: How Far Can We Go If We Really Need to?*, ACEEE Summer Study on Energy Efficiency in Buildings, 10-44 through 10-56 (2008), https://www.aceee.org/files/proceedings/2008/data/papers/10_435.pdf; Philip Mosenthal, *Do Potential Studies Accurately Forecast What is Possible in the Future? Are We Mislabeling and Misusing Them?: Presentation for ACEEE Energy Efficiency as a Resource Conference*, Optimal Energy, Inc. (Sept. 21, 2015), https://www.aceee.org/sites/default/files/pdf/conferences/ee/2015/Philip_Mosenthal_Session2D_EER15_9.21.15.pdf; and Chris Kramer & Glenn Reed, *Ten Pitfalls of Potential Studies*, Regulatory Assistance Project (2012), <https://www.raonline.org/wp-content/uploads/2016/05/energyfutures-kramerreed-tenpitfalls esdraft2-2012-oct-24.pdf>.

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1 approaches and assumptions influence energy efficiency potential estimates.”⁶⁴ The
2 report concludes, among other things, that

3 given the inaccuracy of models and the generally conservative approach of
4 these studies, there is likely a great deal of additional cost-effective potential
5 available beyond what is identified. . . . Moreover, given the fact that most
6 studies base their customer-participation models on economics, even short-
7 term forecasts of market dynamics are murky. This is because studies tend
8 to downplay the impact of program design elements such as marketing and
9 education, as well as the non-energy justifications for investing in energy
10 efficiency.⁶⁵

11
12 These conservatisms would almost certainly be inherent in the Companies’ potential
13 study even without the undermining shortcuts Cadmus took in the 2022 update,
14 (presumably at the Companies’ direction) but as performed, the estimate of achievable
15 potential is indefensible.

16 **Q. Are you able to provide an example of a utility EE program that exceeded what was**
17 **considered achievable?**

18 A. Yes. Consider the example of Public Service Company of Colorado (“PSCo”) which has
19 a strong history of EE programs. PSCo achieved 1.45% savings as a percent of sales in
20 2018,⁶⁶ and hired Navigant to conduct a potential study that estimated achievable
21 potential to be 410 GWh in 2019, and 405 in 2020. Yet, the Public Utility Commission of
22 Colorado established a higher savings goal of 500 GWh for PSCo. As a result, the utility
23 ultimately achieved savings significantly greater than what the study said was achievable,

⁶⁴ Neubauer Report at iv.

⁶⁵ *Id.* at 39.

⁶⁶ 2020 Utility EE Scorecard at 26 (Table 8. Scores for net savings as a percentage of retail sales in 2018, showing 1.45% savings for PSCo subsidiary Xcel CO).

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1 as shown in Table 4:⁶⁷

2 *Table 4: PSCo Achievable and Reported Savings*⁶⁸

Year	Reference Case Achievable Potential	PSCo Proposed Savings	Commission Ordered Annual savings	Reported Annual Savings
2019	410	350	500	504
2020	405	350	500	466

3

4 The fact is that potential studies are tools used to create estimates and are not capable of
5 determining actual limits to what is achievable.

6 **Q. Did the Companies include avoided capacity costs in their screening of the proposed
7 DSM-EE Program Plan?**

8 A. Yes. My understanding is that they used the roughly \$136 value referenced above to

⁶⁷ Colorado differs in many respects from Kentucky, however these differing factors are reflected in the potential study analysis conducted in each state. This example is not intended to demonstrate the specific level of savings achieved in Colorado – rather it is to show that its potential study, while indicating an aggressive level of savings, still underestimated what the utility would ultimately achieve.

⁶⁸ Colo. Pub. Utils. Comm’n (“Colo. PUC”), *In re Matter of the Application of Public Service Company of Colorado for Approval of a Number of Strategic Issues Relating to Its Electric and Gas Demand Side Management Plan*, Proceeding No. 17A-0462EG, Direct Testimony of Shawn M. White, Table SMW-D-1 at 28, Table SMW-D-4 at 46 (July 3, 2017), from “Reference Case Achievable Potential” and “PSCo Proposed Savings”; “Commission Ordered Annual savings” from CO PUC, Decision No. C18-0417 at 21–22, Proceeding No. 17A-0462EG (Apr. 11, 2018); Colo. PSC, *In re Matter of The Application of Public Service Company of Colorado For Approval of Its Electric and Natural Gas Demand side Management (DSM) Plan for Calendar Years 2019 and 2020*, Proceeding No. 18A-0606EG, Public Service Company of Colorado 2019 Demand-Side Management Annual Status Report at 6 (Apr. 1, 2020), 2019 Reported savings from “Reported Annual Savings”; and Colo. PSC, *In re Matter of The Application of Public Service Company of Colorado For Approval of Its Electric and Natural Gas Demand side Management (DSM) Plan for Calendar Years 2019 and 2020*, Proceeding No. 18A-0606EG 2020 Reported savings from Public Service Company of Colorado 2020 Demand-Side Management Annual Status Report at 7, (Apr. 1, 2021).

Note that 2020 savings were below forecast due to COVID-19, but were still significantly more than the potential study achievable potential. PSCo’s approved plan in Proceeding No. 20A-0287EG calls for 538 GWh savings in 2021 and 523 GWh in 2022. Colo. PSC, *In re Matter of the Application of Public Service Company of Colorado for Approval of Its Electric and Natural Gas Demand-Side Management (DSM) Plan for Calendar Years 2021 and 2022*, Proceeding No. 20A-0287EG, Final 2021 Demand Side Management Plan at 6 (Apr. 1, 2022), and Final 2022 Demand Side Management Plan at 7 (Mar. 31, 2023).

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1 screen the programs it had selected for possible inclusion in the portfolio.⁶⁹ The problem
2 is that program selection was not informed by a fulsome potential study update, and
3 several potentially high-impact programs were thus omitted from consideration. The
4 properly conceived amount of savings available through different programs was similarly
5 not reflected in the Plan development process.

6 **Q. What process did the Companies use to determine which programs to include in the**
7 **Plan?**

8 A. The Companies indicate that

9 with input from the DSM-EE Advisory Group, the Companies and
10 Cadmus formulated the proposed 2024-2030 DSM-EE Program Plan by
11 beginning with a pool of 39 possible programs that they developed by
12 researching and reviewing successful programs other utilities across the
13 nation have implemented. Using a scoring rubric, the Companies and
14 Cadmus evaluated and scored all 39 possible programs to determine which
15 warranted further consideration and detailed analysis.⁷⁰

16 But since this process was not informed by a meaningful potential study, it was highly
17 subjective rather than evidence-based.

18 **Q. Did this process identify all the successful program types that you have observed in**
19 **your work across the Country?**

20 A. In my review of the program list, I would agree that the Companies identified – but did
21 not assess – the primary program types that are implemented in the jurisdictions in which
22 I have worked. However, I cannot understand how the Companies and Cadmus
23 determined not to assess the cost-effectiveness of several program types that are prevalent
24 in utility EE portfolios. Specifically, the Companies determined not to conduct cost-

⁶⁹ LGE & KU Response to JI First Supplemental Q28(b).

⁷⁰ Bevington Direct at 8, lines 10–15.

1 effectiveness testing on “Midstream HVAC Rebates,” “Downstream Rebates,” Home
2 Energy Reports,” “New Home Construction Rebates,” and “Strategic Energy
3 Management.”⁷¹ These are not esoteric, niche EE programs, but rather are fundamental
4 components of many utility energy efficiency portfolios that often contribute significantly
5 to overall savings. Indeed, Cadmus identified most of these types of programs as
6 components of a strategic plan it developed for Dominion Energy Virginia
7 (“Dominion”),⁷² making it all the more confusing that they were not assessed for cost-
8 effectiveness in the Companies’ Plan development process.

9 **V. ADDRESSING THE INADEQUATE EE PLAN**

10 **Q. You have explained your view that the Companies’ 2022 potential study is deeply**
11 **flawed. Do these flaws affect the proposed 2024–2030 DSM-EE Plan?**

12 A. Yes. I believe the Companies and Cadmus failed to adequately consider how much EE
13 can be cost-effectively achieved for their customers throughout the Plan development
14 process, and that the 2022 update is wholly lacking as a foundational element of the
15 2024–2030 Plan. For the Commission’s consideration I developed a high-level savings
16 and cost scenario that incorporates much more DSM-EE than the Companies posit is
17 achievable based on their flawed analysis. My recommendations are based in part on the
18 findings of a report EFG prepared for clients in Virginia, titled *Pathways for Energy*
19 *Efficiency in Virginia* (“VA Pathways”).⁷³ In this report, EFG benchmarked savings

⁷¹ Bevington Direct, Exhibit JB-1 at 61, Figure C-1. DSM/EE Program Scoring Rubric Results.

⁷² State Corp. Comm’n of Va., Case No. PUR-2021-00247, Direct Testimony of Terry M. Fry, Schedule 1 at 11, (p. 13 of 151 of pdf) (Dec. 14, 2021), <https://www.scc.virginia.gov/docketsearch/DOCS/67%40d01!.PDF>.

⁷³ Jim Grevatt & Liz Bourguet, *Pathways for Energy Efficiency in Virginia: Scenarios for Virginia Electric and Power Company to Achieve the Virginia Clean Economy Act Energy Efficiency Savings*

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1 acquisition costs and the amount of savings achieved by different program types for
2 twelve investor-owned utilities (“IOUs”) that achieved savings equal to between 1% and
3 2% of sales in 2018. EFG carried out this project to demonstrate how Dominion could
4 comply with its statutory savings targets. The report was completed in 2021, and
5 analyzed reported net savings and program costs from 2018 program reports. Even
6 though there have been changes in the utility EE landscape in the ensuing period, the
7 findings are highly instructive. Interestingly, as a consultant to Dominion, Cadmus was
8 made aware of the report.

9 **Q. How did you use the VA Pathways report to inform your recommendations in the**
10 **instant case?**

11 A. Because the Companies’ 2022 update and plan development process are both so deeply
12 flawed, I considered the achievements of the utilities EFG included in VA Pathways. I
13 generally assumed that the Companies should be expected to achieve the average level of
14 savings in several additional program areas that it could reasonably be expected to
15 implement. These include the programs I mentioned above, that the Companies did not
16 assess in its process.

17 **Q. What was the process you used to determine average savings levels for the VA**
18 **Pathways utilities?**

19 A. The VA Pathways project was specifically developed to enable the development of
20 “what-if” scenarios by applying the averaged results of the twelve referenced high-
21 achieving utilities to new territories, such as Dominion’s service area. To do this, EFG

Goals, Am. Council for an Energy Efficient Econ. (June 2, 2021), <https://www.aceee.org/pathways-energy-efficiency-virginia> (attached as Exhibit JG-2).

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1 grouped individual utilities' programs into common program types, such as residential
2 lighting and appliances, residential HVAC, and so on. EFG calculated the savings as a
3 percentage of sector sales each utility was achieving in each common program type. For
4 example, for the Commercial and Industrial ("C&I") Prescriptive program type,⁷⁴ the
5 utilities EFG looked at for VA Pathways, on average, achieved about 0.734% of their
6 C&I sector sales in 2018, and for the C&I Custom program type they achieved on
7 average about 0.642% of their C&I sales. The percent of non-residential sales for each of
8 the utilities that had an applicable program and the averages are shown in Table 5.

⁷⁴ It is common for utility EE program administrators to offer a C&I "Prescriptive" program that provides fixed rebate amount for prescribed measures that are common to many types of customers, as well as "Custom" programs that provide incentives for less common measures that may require unique analysis to determine potential savings and incentives.

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Table 5: VA Pathways Percent of non-residential sales for non-residential prescriptive and custom programs⁷⁵

	Non-residential prescriptive	Non-residential custom
AEP Ohio	0.795%	0.246%
Ameren MO	0.877%	0.437%
BGE	0.807%	0.714%
ComEd	0.789%	0.076%
Consumers		1.237%
DEC	0.360%	0.065%
DTE	0.762%	0.353%
Duke OH	0.825%	0.316%
Entergy AR	0.093%	0.876%
MidAm	0.698%	1.695%
First Energy Ohio	0.298%	
Xcel MN	1.764%	1.048%
Average	0.734%	0.642%
Average Highest 3	1.155%	1.327%
Average Lowest 3	0.250%	0.129%

So, on average, the prescriptive and custom C&I programs combined achieved total savings of 1.34% of sector sales. Importantly, by calculating savings as a percent of sector sales, one can reasonably apply that percentage to other utilities' sector sales, and while not perfect, to a degree, this equalizes the different characteristics of different utility territories.

Q. How did you use this information to develop a savings recommendation for the Companies?

A. I reviewed the Companies' Plan and observed the common program types that were

⁷⁵ Jim Grevatt & Liz Bourguet, Pathways for Energy Efficiency in Virginia: Scenarios for Virginia Electric and Power Company to Achieve the Virginia Clean Economy Act Energy Efficiency Savings Goal, Modeling Tool: Consolidated Savings tab, rows 12, 13 (June, 3, 2021), downloadable at <https://www.aceee.org/pathways-energy-efficiency-virginia>.

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1 either omitted – of which there are several – or for which savings estimates were
2 unreasonably low when compared with the VA Pathways utilities. I then applied the
3 average percentage of sector sales results from VA Pathways to the Companies’
4 residential and non-residential MWh sales.⁷⁶ I then adjusted the results based on what the
5 Companies proposed in their Plan – for example, the VA Pathways utilities reported
6 residential whole house retrofit savings that, on average, equaled 0.1237% of residential
7 sales. This would equal 12,584 annual MWh saved for the Companies in a whole house
8 retrofit program. However, given the Companies have already proposed 4,670 MWh⁷⁷
9 from the Online Audit program when fully ramped up in 2028, I propose an additional
10 8,000 MWh savings from a residential whole house retrofit program, so that the total
11 from this program area is approximately equal to the average achievement of the VA
12 Pathways utilities. This is illustrated in Table 6.

Table 6: EFG Proposed Whole House Retrofit Savings (2028)

2021 KU-LG&E Residential Sales (MWh)	10,176,781
VA Pathways Average Savings	0.1237%
KU-LG&E Expected Whole House Retrofit Savings	12,584
Residential Online Audit Savings (2028)	4,670
Expected Additional Whole House Retrofit Savings (2028)	7,914
EFG Recommended Whole House Retrofit Savings (2028)	8,000

14
15 **Q. Did you include all the programs that were identified in VA Pathways when**
16 **developing your proposed savings scenario for the Companies?**

17 A. No. Due to more stringent federal lighting standards it would be unreasonable to expect
18 the Companies to achieve the level of savings from retail lighting promotions that was

⁷⁶ Sales data from 2021 EIA 861, “Sales_Ult_Cust_2021”.

⁷⁷ Bevington Direct, Exhibit JB-1 at 55, Table A-4.

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1 common in 2018, so I did not include any increased savings from that program type. I
 2 also did not include savings from what EFG termed in VA Pathways as “low-income
 3 low-cost” programs for the same reason, as these would typically have been LED lighting
 4 distribution programs. Since most of the utilities in the VA Pathways implemented
 5 combined lighting and appliances programs, EFG was not able to separate out appliance
 6 savings, so I did not include savings from promotion of efficient appliances in my
 7 recommended savings levels.

8 **Q. What are the program types that were identified in VA Pathways?**

9 A. The fourteen “common” program types from the VA Pathways report are listed in the
 10 left-hand column in Table 7, along with a mapping to the Companies’ proposed and my
 11 recommended additional programs. Note that the programs listed with an asterisk in the
 12 right-hand column are recommended by me and are not currently proposed by the
 13 Companies.

14 *Table 7: Mapping VA Pathways to Recommended Additional KU-LG&E Programs*

VA Pathways "Common" Program Types	KU-LG&E Program
Residential appliances and lighting	N/A
Residential HVAC	Residential HVAC*
Residential whole house-retrofit	Residential whole house-retrofit* & Online Audit
Residential new construction	Residential new construction*
Multifamily	Multifamily*
Low-income multifamily	Income Qualified Solutions
Low-income single family	
Low-income low-cost	N/A
Residential behavioral	Residential behavioral*
Non-residential prescriptive	Business Solutions
Non-residential custom	
Non-residential new construction	
Non-residential small business	
Large energy users	

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1 **Q. Did you develop savings recommendations for the other programs in Table 7,**
2 **following a similar process to what you described above for the Whole House**
3 **Retrofit program?**

4 A. Yes. For most of the programs, I applied the average percent of sector sales from VA
5 Pathways to LGE & KU’s sector sales. In some cases, such as for the Residential HVAC
6 program, I recommend less than the average in this case, based on savings potential likely
7 being somewhat reduced due to increasing baselines. My recommended savings levels for
8 2028, by program, are shown in Table 8. Consistent with the Companies’ filing, these
9 savings are expressed in gross, rather than net, terms. I also note that fully half of the
10 increase I recommend is for residential customers to, in part, address the imbalance in the
11 Companies’ proposed savings that are so dominated by the Business Solutions program.

Table 8: 2028 Gross EE Savings (Incremental MWh per year)

KU-LG&E Proposed	Income-Qualified Solutions	4,405
	Appliance Recycling	6,057
	Residential Online Audit	4,670
	Business Solutions	134,373
EFG Recommended Additional Savings	Proposed additional residential appliances and lighting	-
	Proposed Additional Residential HVAC	5,000
	Proposed Additional Residential whole house-retrofit	8,000
	Proposed Additional Residential new construction	3,165
	Proposed Additional multifamily	5,269
	Proposed Additional Low-income multifamily	1,514
	Proposed Additional Low-income single family	2,265
	Proposed Additional Low-income low-cost	-
	Proposed Additional Residential behavioral	50,000
	Proposed Additional Business Solutions	73,738
Total KU-LG&E Proposed		149,505
Total EFG Recommended Additional Savings		148,951
Total KU-LG&E/EFG Combined Savings		298,456

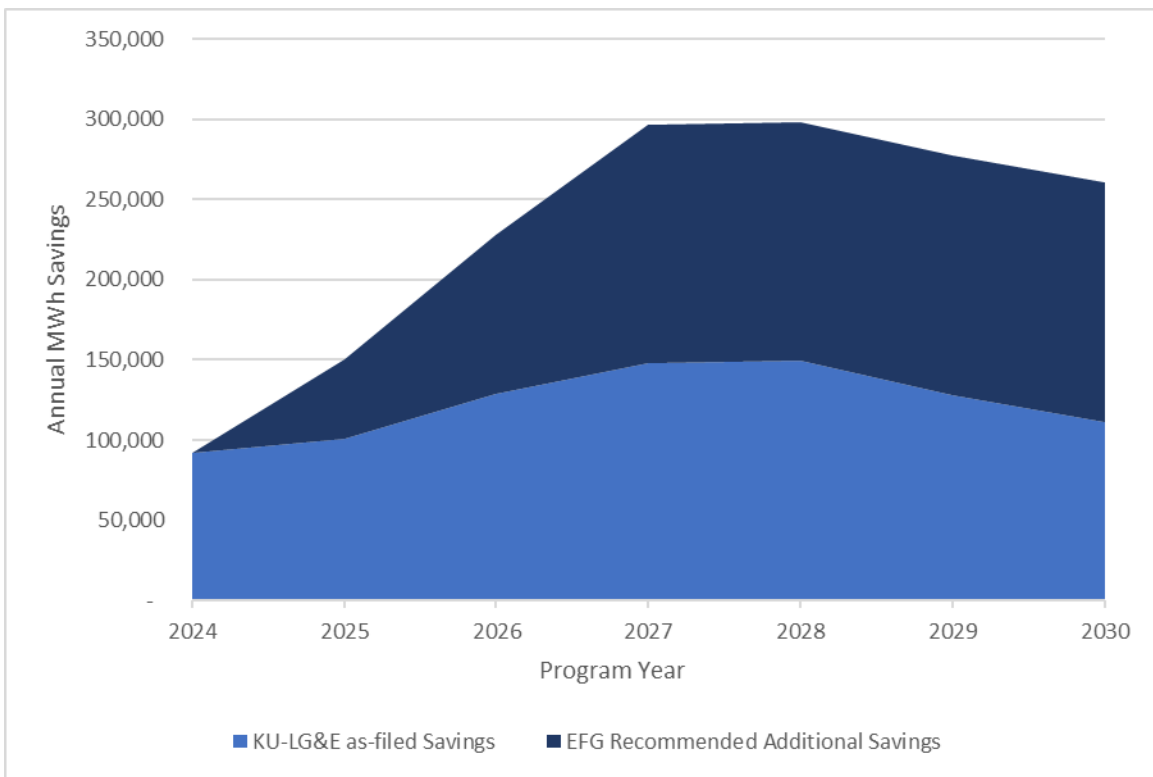
13

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1 **Q. Do you assume the Companies can achieve this level of savings in the first year of**
2 **program implementation?**

3 A. No. I ramped up the program savings over three years, beginning in 2024, to achieve
4 these higher savings level in 2027. This is illustrated in Figure 5. I also want to point out
5 that the falloff in savings in 2029 and 2030 is due to the Companies' reduced proposal for
6 Business Solutions in those years. The additional savings I propose far exceed the
7 Companies' presumed reduction, but the Commission should not assume that even more
8 savings would not be achievable.

9 *Figure 5: EFG Proposed Program Ramp-Up*



10

11 **Q. Why is this level of savings achievable?**

12 A. The fact that my recommendation remains well below the level of portfolio savings that
13 has actually been achieved by the twelve leading utilities identified in the VA Pathways

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1 project is significant and more compelling than the flawed potential study update
2 prepared by Cadmus and adopted by the Companies. My recommended savings on
3 average for the 2024–2030 Plan period and the Companies’ proposed average savings for
4 the period are compared with the accomplishments of the VA Pathways utilities in Table
5 9.

Table 9: NET Savings as a % of Total Sales, 2018⁷⁸

	% Savings
Entergy Arkansas	1.08%
MidAmerican Energy	1.27%
Xcel Minnesota	1.73%
Baltimore Gas and Electric	1.96%
Consumers Energy	1.55%
Ameren Missouri	1.03%
Commonwealth Edison	2.08%
DTE Electric	1.50%
Duke Energy Carolinas	1.01%
AEP Ohio	1.00%
Duke Energy Ohio	1.32%
Ohio Edison	1.12%
Average 2024-2030 KU-LG&E Proposed (GROSS)	0.43%
Average 2024-2030 KU-LG&E Proposed (NET)	0.35%
Average 2024-2030 EFG Recommended KU-LG&E (GROSS)	0.86%
Average 2024-2030 EFG Recommended KU-LG&E (NET)	0.71%

7
8 **Q. You mention that you do not include savings from retail lighting programs in your**
9 **recommendation, but do the reported savings for the utilities in Table 9 include**
10 **lighting savings?**

11 A. Yes, they definitely do. However, they also achieved significant savings in each of the
12 common program types that I reference, and which form the basis of my

⁷⁸ 2020 Utility EE Scorecard at 26 (Table 8: Scores for net savings as a percentage of retail sales in 2018); LGE & KU savings data from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56. LGE & KU net savings calculated by multiplying gross savings by 0.831, the net-to-gross factor used by ACEEE in the utility scorecard when utilities only reported gross savings.

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1 recommendation. Had I included savings from retail lighting programs in my
2 recommendation, total savings and the resulting net savings as a percentage of total sales
3 would have been much higher.

4 **Q. Are there other factors in your analysis that support your conclusion that the**
5 **savings are achievable?**

6 A. Yes, there is another important conservatism incorporated in my recommendation, which
7 is this: the Companies report *gross* savings in their plan, and to be consistent, the savings
8 levels I recommend are also in terms of gross savings. In industry parlance, “gross”
9 savings are the savings that occur for participants regardless of whether or not the
10 program caused them to purchase the high efficiency equipment, and “net” savings are
11 the savings the program causes to occur, with savings from free riders – those customers
12 who would have purchased efficient equipment even if there was no program – removed.
13 However, the VA Pathways analysis was based on *net* savings achieved. For an accurate
14 translation of the VA Pathways to LGE & KU, it would have been appropriate to “gross
15 up” my proposed savings, which would have increased them by about 20%. I did not do
16 this translation, recognizing that even though I believe it would be achievable, the
17 Companies will need time to ramp up and expand their programs. This makes my
18 proposal much more conservative than it would be if I had reflected the fact that VA
19 Pathways is based on net savings and adjusted my proposal to gross savings. My
20 conservative approach also supports my recommendation that the Commission direct the
21 Companies to file an update to the 2024-2030 DSM-EE Plan in 2026.

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1 **Q. Will your program recommendations bolster the Companies’ limited proposals with**
2 **respect to the Companies’ interest in “helping reduce customers’ energy burden,**
3 **improving indoor health and comfort, addressing environmental concerns, and**
4 **contributing to workforce development and economic growth for the state of**
5 **Kentucky”?**⁷⁹

6 A. Yes. The whole house retrofit, residential new construction, and HVAC programs will all
7 provide tangible benefits in each of those areas. Well-implemented whole house retrofit
8 programs will make homes warmer in winter and cooler in summer, and often mitigate
9 moisture issues that can lead to mold and mildew growth, thereby reducing related
10 respiratory illnesses. And as I note earlier, efficient buildings are able to maintain safe
11 indoor temperatures for a longer period of time when extreme weather events cause
12 power system disruptions.⁸⁰ My recommended increases in the Income-Qualified
13 Solutions program will, if properly targeted by the Companies, reduce energy burdens for
14 significantly more households than would the Companies’ proposal on its own. Low-
15 income communities and communities of color, particularly African American
16 communities, often experience overlapping hardships such as high housing burden, food
17 insecurity, and lack of access to healthcare,⁸¹ and expanding Income-Qualified Solutions
18 to reach more households as I recommend will help address these issues.

⁷⁹ Bevington Direct, Exhibit JB-1 at 2.

⁸⁰ See, e.g., Urban Green Council, *Baby It’s Cold Outside* (Feb. 2014), <https://www.urbangreencouncil.org/wp-content/uploads/2022/11/2014.02.05-Baby-Its-Cold-Inside.pdf> and Sneha Ayyagari et al., *Hours of Safety in Cold Weather: A Framework for Considering Resilience in Building Envelope Design and Construction*, Rocky Mountain Inst. (Feb. 2020), <https://rmi.org/wp-content/uploads/2020/02/Hours-of-Safety-insight-brief.pdf>.

⁸¹ Jamal Lewis et al., *Energy Efficiency as Energy Justice: Address Racial Inequalities through Investments in People and Places*, *Energy Efficiency* 13: 419–32 (effective Mar. 2019), <https://doi.org/10.1007/s12053-019-09820-z>.

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1 **Q. Have you estimated the costs to achieve the level of savings you recommend?**

2 A. I have used the reported average cost-to-achieve values from VA Pathways to provide an
3 illustration of the expected costs, noting that this is not a substitute for the development
4 of budgets tied to a specific revised program Plan developed by the Companies. The
5 illustrative annual EE program costs are shown in Table 10. For perspective, the annual
6 average of the total EE budgets I propose would equal 1.74% of the Companies' 2021
7 reported revenues. The ACEEE utility scorecard would award the Companies with 1.5
8 points out of 7 for spending at this level, which would have ranked them 30th in the level
9 of spending among the fifty-two utilities considered in ACEEE's study – in other words,
10 roughly in the middle for large utility EE programs, and several notches up from where
11 they would be based on the programs as-filed.⁸²

⁸² 2020 Utility EE Scorecard at 28 (Table 10: Scores for spending as a percentage of revenue in 2018).

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1

Table 10: Cost of Additional Savings

	2024	2025	2026	2027	2028	2029	2030
Proposed additional residential appliances and lighting	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed Additional Residential HVAC	\$0	\$1,090,737	\$2,181,473	\$3,272,210	\$3,272,210	\$3,272,210	\$3,272,210
Proposed Additional Residential whole house-retrofit	\$0	\$2,231,375	\$4,462,751	\$6,694,126	\$6,694,126	\$6,694,126	\$6,694,126
Proposed Additional Residential new construction	\$0	\$963,571	\$1,927,141	\$2,890,712	\$2,890,712	\$2,890,712	\$2,890,712
Proposed Additional Multifamily	\$0	\$694,803	\$1,389,607	\$2,084,410	\$2,084,410	\$2,084,410	\$2,084,410
Proposed Additional Low-income multifamily	\$0	\$991,997	\$1,983,994	\$2,975,992	\$2,975,992	\$2,975,992	\$2,975,992
Proposed Additional Low-income single family	\$0	\$1,658,277	\$3,316,555	\$4,974,832	\$4,974,832	\$4,974,832	\$4,974,832
Proposed Additional Low-income low-cost	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed Additional Residential behavioral	\$0	\$1,183,205	\$2,366,411	\$3,549,616	\$3,549,616	\$3,549,616	\$3,549,616
Proposed Additional Business Solutions	\$0	\$4,493,692	\$8,987,384	\$13,481,077	\$13,481,077	\$13,481,077	\$13,481,077

Total Proposed Additional		\$13,307,658	\$26,615,316	\$39,922,975	\$39,922,975	\$39,922,975	\$39,922,975
Total KU-LG&E Proposed	\$15,350,000	\$16,952,000	\$20,995,000	\$21,504,000	\$22,130,000	\$21,057,000	\$20,595,000
Total including KU-LG&E Proposed	\$15,350,000	\$30,259,658	\$47,610,316	\$61,426,975	\$62,052,975	\$60,979,975	\$60,517,975

2

3 **Q. Have you assessed the cost-effectiveness of your proposed savings levels?**

4 A. I have not. However, I have based my recommendation on utility programs that all have a
5 cost-effectiveness requirement. Of course, those requirements vary, and it is not
6 necessarily the case that what is cost effective in one jurisdiction will be similarly cost
7 effective somewhere else. My recommendation to the Commission is that it require the
8 Companies to develop a revised 2024–2030 DSM-EE Plan that broadly reflects my
9 recommended levels of savings and that the Companies iterate the program designs to
10 identify cost effective approaches. In this process, it is critical that the Companies do not
11 take the same shortcuts they took with the proposed 2024–2030 Plan: omitting
12 consideration of programs that achieve high levels of savings for other utilities without

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1 assessing their cost-effectiveness at all, let alone with the \$0 avoided capacity costs used
2 in the potential study analysis. If the Companies do not find that these levels of savings
3 are cost effective, the onus should be on them to transparently demonstrate that they have
4 made every effort to identify program paths to achieve the targeted savings.

5 **Q. Are there other steps you recommend the Commission direct the Companies to take**
6 **with respect to their 2024–2030 DSM-EE programs?**

7 A. Yes, I have a recommendation related to the duration of the program implementation
8 period. In the instant case, the Companies, of their own volition, recognized that
9 changing circumstances dictated they should propose an update and expansion of their
10 DSM-EE programs. Had they not filed a proposed program update, the likelihood is that
11 their customers would have been stuck with an out-of-date portfolio, based on flawed
12 avoided capacity cost assumptions, for the duration of the approved plan period. There is
13 every reason to think that similar, rapidly-evolving changes in market conditions will
14 continue to unfold. Therefore, rather than relying on the Companies to determine whether
15 or not program updates are warranted, I recommend the Commission direct them to file a
16 Plan update early in 2026 to reflect a refreshed program plan that would begin in 2027.
17 The plan update should be based on recent evaluated program performance and a new EE
18 potential study reflecting current avoided cost forecasts. Because there is value in
19 establishing longer-duration expectations for program implementation, it is reasonable for
20 the Companies to continue developing plans for a seven-year period, but an expectation
21 for updates on a three-year interval should be included in the Commission’s direction to
22 the Companies.

1 **VI. PAY AS YOU SAVE**

2 **Q. Did the Companies include a “Pay As You Save” (“PAYS”) program in its 2024–**
3 **2030 DSM-EE Plan?**

4 A. It did not. The Companies state that their research included “a robust analysis specifically
5 on a Pay As You Save (“PAYS”) program; however, the Companies decided not to
6 include the financing program in the final proposed portfolio in this filing because it was
7 not cost-effective and the IRA funding is expected to cover that need for customers.”⁸³
8 I disagree that their analysis was “robust.” Rather, consistent with the Companies’
9 approach to the potential study update, it was flawed. I also believe it is premature to
10 summarily conclude that the IRA funding will fulfill customers’ financing needs.

11 **Q. In what ways was the PAYS analysis flawed?**

12 A. There are two issues that immediately rise to the surface. First, the Companies only
13 selectively modified the program data parameters provided to them by Mountain
14 Association. Specifically, the Companies reduced the capacity savings per project from
15 the 1.25 kW provided them to 0.47 kW per project, “based on WeCare kWh/kW ratio
16 since likely similar weatherization/HVAC measures will be installed.”⁸⁴ And to be clear,
17 my point is not that they used the wrong kW value, which may or may not be true – my
18 point is that they were selective about what they changed. I reviewed the WeCare data
19 and requested confirmation in discovery – which the Companies provided – that the
20 Companies use a 20-year Estimated Useful Life (“EUL”) for measures in that program,
21 but in the PAYS analysis, they only used 15 years, based on the data from Mountain

⁸³ Bevington Direct, Exhibit JB-1 at 8.

⁸⁴ Bevington Direct, Exhibit JB-3 at 2, Table 1: Cost-Effectiveness Analysis Data Source Summary.

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1 Association.⁸⁵ When asked to provide the rationale for using a shorter measure life in the
2 PAYS analysis they simply said they “used assumptions provided by the Mountain
3 Association during the DSM Advisory Group process.”⁸⁶

4 **Q. Why is that a problem?**

5 A. Cadmus and the Companies clearly reviewed the assumptions provided by Mountain
6 Association, otherwise, they would not have changed the capacity values used in the
7 analysis. But it is clear that they were selective in their changes. Reducing the avoided
8 capacity savings reduced the value of the program and made it less cost-effective.
9 Increasing the expected measure life to be consistent with the values used in WeCare
10 would have improved program cost-effectiveness, which Cadmus and the Companies
11 ignored, suggesting their review was biased against finding a cost-effective solution. In
12 my view, if they were going to change anything, they should have updated all of the
13 assumptions to reflect best-available data.

14 **Q. Did you observe other concerns with the Companies’ analysis of PAYS?**

15 A. Yes. The Companies and Cadmus analyzed several scenarios of their own devising, all of
16 which had either 100 participants per year or 1,000 participants per year. However,
17 regardless of the participation, the Companies’ analysis assumes an identical level of first
18 year program administration costs (\$356,000) and first year labor costs (\$202,510).⁸⁷ In
19 response to discovery the Companies confirmed their position that “these costs would not
20 vary with participation.”⁸⁸ This is implausible, and as above, suggests there was no

⁸⁵ LGE & KU Response to JI First Supplemental Q6(a) and Q6(b).

⁸⁶ LGE & KU Response to JI First Supplemental Q6(c).

⁸⁷ Bevington Direct, Exhibit JB-3 at 2, Table 1: Cost-Effectiveness Analysis Data Source Summary.

⁸⁸ LGE & KU Response to JI First Supplemental Q4(b)(i).

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1 serious effort made to identify potentially cost-effective approaches to support customers
2 through a PAYS approach.

3 **Q. Do you have other concerns with the Companies' analysis?**

4 A. Yes. The Companies assumed flat participation at the selected levels for each year of
5 program implementation for 2025–2030.⁸⁹ In other words, at the 100 households per year
6 level, there would be 100 participants in each year of the multi-year program. It would be
7 more realistic to have modeled increasing participation in each year, as the Companies
8 did for the Residential Online Audit program⁹⁰ and the Business Solutions program.⁹¹
9 This would have spread startup and administration costs over a greater number of
10 households, which would improve cost-effectiveness results. The Companies should be
11 expected to do more than simply test information they are handed and shrug their
12 shoulders. Rather, the Commission should expect them to thoughtfully consider
13 alternative approaches that could lead to improved cost-effectiveness and increased
14 savings. Fundamentally, it is consistent with the utilities' least-cost obligation to actively
15 research, iterate, and propose cost-effective solutions to reduce energy waste through
16 DSM-EE programs.

17 **Q. You said it is premature for LGE & KU to conclude that the IRA will fulfill
18 customers' financing needs. Can you explain why that is a premature judgment?**

19 A. The Companies came to this conclusion because “the Kentucky Energy and Environment
20 Cabinet (EEC) expressed interest in developing a revolving loan fund with IRA funding

⁸⁹ Bevington Direct, JB-3 at 3.

⁹⁰ Bevington Direct, Exhibit JB-1 at 55, Table A-4.

⁹¹ *Id.* at 55, Table A-5.

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1 and indicated the possibility of a nationwide ‘Green Bank’ offering energy efficiency
2 financing or expanding Louisville’s Energy Project Assessment District (EPAD) program
3 and other Property Assessed Clean Energy (PACE) programs to residential customers.”⁹²
4 Apparently, the evidence the Companies used to wash their hands of a financing program
5 is that the EEC “expressed interest” and there is a “possibility” of a revolving loan fund. I
6 hardly think that makes a compelling case. There is much work to be done, and many
7 hurdles to clear before any of these possibilities would become a reality, if ever, and
8 presumably there would be many KU customers who could not participate in Louisville’s
9 EPAD program.

10 **Q. What do you recommend with respect to a PAYS program?**

11 A. I recommend the Commission direct the Companies to include a more fulsome analysis
12 of the potential benefits of a PAYS program as part of the whole-house retrofit program
13 development the Companies should undertake. Importantly, the Companies and their
14 consultant should use their industry knowledge to assess best-practice designs, because it
15 is in the interest of their customers, and thus is their obligation, to identify and implement
16 cost-effective DSM-EE. PAYS, or a revolving loan program that provides credit
17 guarantees for customers who may not qualify under conventional lending guidelines, has
18 the potential to enable the installation of EE measures that would otherwise never be
19 installed. This may be especially true for customers with household incomes between
20 80%–150% of Area Median Income (“AMI”) who are eligible for IRA rebates at the 50%
21 of cost level.⁹³ Many of these moderate income households will not be able to take

⁹² *Id.* at 8.

⁹³ *See, e.g., Weatherization: Electrification Rebate, Rewiring of America,*

1 advantage of the IRA rebates if they are unable to obtain financing for the remaining 50%
2 of the measure costs, because they will not be able to come up with another means of
3 paying the cost-share of the EE measures. PAYS or other financing programs can be seen
4 as leveraging or enabling programs that work with utility or governmental rebate and tax
5 credit programs to allow more customers to install EE measures than would otherwise be
6 possible. This analysis should include not only PAYS, but other financing program
7 designs the Companies could cost-effectively implement to support customers in
8 achieving meaningful EE savings.

9 **VII. DEMAND RESPONSE SOLUTIONS**

10 **Q. Do the Companies propose any demand response programs in their Plan to mitigate**
11 **peak demands?**

12 A. Yes. The Companies propose the “Connected Solutions” umbrella program that “includes
13 the program currently known as the Residential and Small Nonresidential Demand
14 Conservation Program (Direct Load Control (“DLC”)) and three new subcomponents:
15 Bring-Your-Own Device (“BYOD”), Optimized Charging, and Online Transactional
16 Marketplace.”⁹⁴ The Companies indicate that they will “continue DLC for current
17 participants, though participation will decrease over time as switches fail.”⁹⁵ The
18 Companies also indicate that “[a]s switch failures occur, the Companies will direct
19 customers to other demand response offerings,”⁹⁶ although this is not apparent based on

<https://www.rewiringamerica.org/app/ira-calculator/information/weatherization> (last visited July 12, 2023).

⁹⁴ Isaacson Direct at 9, lines 5–10.

⁹⁵ *Id.* at 9, lines 10–12.

⁹⁶ *Id.* at 9, lines 12–13.

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1 projected participation in the BYOD program, which I can explain further. The
2 Companies also propose to launch Peak Time Rebates, a “voluntary behavioral, event-
3 based demand response resource that pays customers to reduce their electric consumption
4 during times of high demand all year round.”⁹⁷ The Companies also propose to continue
5 to ramp up the Large Nonresidential Demand Conservation Program because “[t]he low
6 levelized cost (tipping point cost) of commercial customer curtailment relative to the
7 Companies’ projected avoided capacity cost suggests that additional target markets and
8 incentives could be leveraged to promote and expand this program.”⁹⁸

9 **Q. Why do you say it is not apparent that the Companies will direct customers to other**
10 **programs as switch failures occur?**

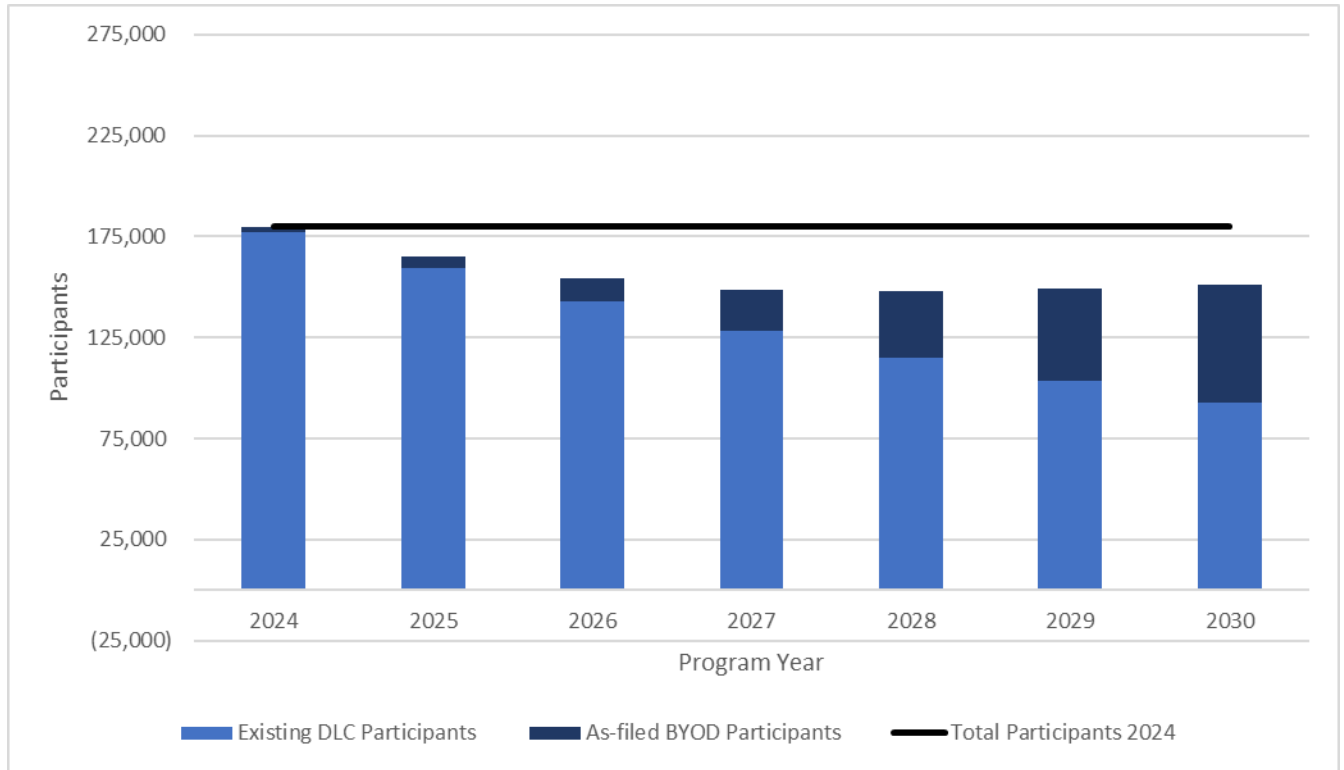
11 A. Simply because the Companies project dramatic attrition from the Direct Load Control
12 (“DLC”) program over the 2024–2030 Plan without a corresponding increase in BYOD
13 program participation. This is illustrated in Figure 6. By 2027, the Companies will have
14 had a net loss of over 31,000 participants in the combined DLC and BYOD programs,
15 and they project they will still have a net loss of nearly 29,000 participants by 2030. To
16 be blunt, the Companies propose to fail to even maintain the residential DR capability
17 they currently have.

⁹⁷ Bevington Direct, Exhibit JB-1 at 48.

⁹⁸ *Id.* at 51.

1

Figure 6: Total Combined DLC and BYOD Participation⁹⁹



2

3 **Q. Will customers who purchase smart thermostats through the Online Transactional**
4 **Marketplace subcomponent of the Connected Solutions program be automatically**
5 **enrolled in the BYOD program?**

6 A. I observed one mention of the idea that Connected Solutions would “[a]dd direct
7 enrollment to demand response offerings for purchasers of applicable measures (i.e.,
8 smart thermostats) through the new Online Transactional Marketplace,”¹⁰⁰ which is
9 encouraging. However, the Plan still shows decreasing demand savings year over year for
10 the Connected Solutions program as a whole.¹⁰¹

⁹⁹ *Id.* at 45, Table 4-1. Connected Solutions Participation Goals.

¹⁰⁰ *Id.* at 15, Table 1-1. Proposed DSM/EE Program Plan Changes.

¹⁰¹ *Id.* at 45, Table 4-2. Connected Solutions Annual and Cumulative Energy and Demand Impacts.

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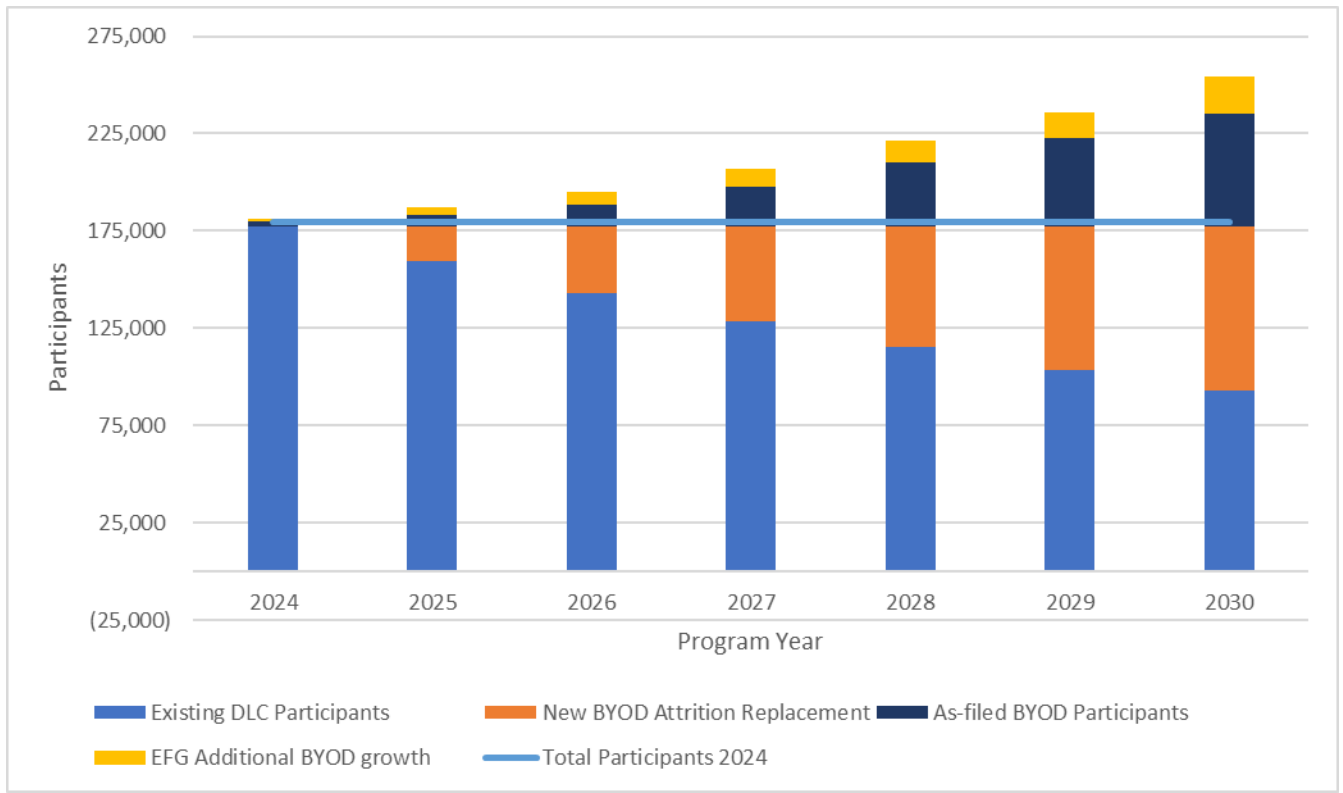
1 **Q. Do you recommend the Commission approve the Companies' DR programs as**
2 **proposed?**

3 A. I recommend the Commission approve the programs, but also that it direct the Companies
4 to significantly increase participation in the Connected Solutions program, specifically,
5 by engaging in expansive, proactive efforts to convert DLC participants to BYOD, by
6 making every effort to engage Marketplace customers in BYOD, and by designing and
7 implementing a campaign to maximize customer enrollment in BYOD.

8 **Q. Have you developed a specific recommendation for the level of participation the**
9 **Companies should pursue?**

10 A. Yes. My recommendation is illustrated in Figure 7. I propose the Companies not only add
11 enough new BYOD participants each year to make up for any DLC attrition, but that they
12 further increase BYOD participation so that the total combined DLC and BYOD
13 participation in 2030 is roughly 254,000 participants.

1 *Figure 7: LGE & KU DLC and BYOD plus EFG Additional BYOD Participants*



2
 3 **Q. Is it plausible to think the Companies could be so successful in enrolling BYOD**
 4 **participants?**

5 A. I believe it is both plausible and consistent with the Companies’ obligation to meet their
 6 customers’ needs at the least cost. I note also, that while the DLC program has
 7 historically been used to mitigate summer peak demands, BYOD is also capable of
 8 reducing winter peak loads – loads that Companies expect to increase as customers’
 9 preference for clean electricity over gas becomes more pronounced. One example of a
 10 utility that has ambitious targets for residential DR customer enrollments is Public
 11 Service Company of Colorado (“PSCo”). PSCo has had a residential direct load control
 12 program in place for over twenty years, with about 201,000 switches currently in the

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1 field¹⁰² and a residential customer base of approximately 1.3 million.¹⁰³ PSCo states that

2 [t]he switches utilized are deemed to have a 15-year life. As there is very
3 little attrition from Saver’s Switch, the switch population is beginning to
4 include a sizeable portion of devices that are beyond their 15-year life. In
5 the 2021/2022 biennial, the company began to initiate maintenance
6 replacements of switches older than 15 years and plans to continue this
7 replacement cycle.¹⁰⁴

8 In fact, it further states that “[b]etween Saver Switch and AC Rewards, the Company
9 aims to install/enroll 17,000 devices per year.”¹⁰⁵ This is quite a contrast to LGE & KU,
10 which plans for attrition from their DLC program and does not expect to make up the
11 difference with new BYOD participation.

12 **Q. Have you estimated a budget for the additional BYOD participants you propose the**
13 **Companies should enroll?**

14 A. Yes. In the Companies’ proposal participating customers will receive \$50 upon
15 enrollment and \$10 per event up to 25 events per year, with a maximum first year
16 incentive of \$300 and a maximum incentive of \$250 each year thereafter.¹⁰⁶ However, I
17 developed my illustrative budget using Cadmus O&M cost of \$34 per participant per
18 year¹⁰⁷ and PSCo’s \$100 enrollment incentive¹⁰⁸ and a slightly more generous \$50 annual

¹⁰² Colo. Pub. Utils. Comm’n, *In re the Matter of the Application of Public Service Company of Colorado for Approval of Its Combined Electric and Natural Gas Demand-Side Management and Beneficial Electrification Plan for Calendar Year 2023*, Proceeding No. 22A-0315EG, Hearing Exhibit 101, Attachment NCM-1, at 285 (July 1, 2022) (“Colo. PUC Hearing Ex. 101: NCM-1”).

¹⁰³ Data from 2021 EIA 861, “Sales_Ult_Cust_2021” .

¹⁰⁴ Hearing Ex. 101: NCM-1 at 285.

¹⁰⁵ *Id.* at 287.

¹⁰⁶ Bevington Direct, Exhibit JB-1 at 46.

¹⁰⁷ Isaacson Direct, Exhibit LI-2 at B-8, Table B-7. Residential DLC BYOT Input Assumptions.

¹⁰⁸ Colo. Hearing Exhibit 101, Attachment NCM-1 at 285.

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1 participation incentive compared with PSCo's \$25 participation incentive.¹⁰⁹ This is
2 illustrated in Table 11.

3 *Table 11: EFG Recommended DR Budget*

	2024	2025	2026	2027	2028	2029	2030
Connected Solutions (as-filed)	\$5,817,000	\$5,922,000	\$7,185,000	\$11,236,000	\$21,955,000	\$23,386,000	\$25,237,000
Connected Solutions (EFG Additional BYOD)	\$220,800	\$3,933,888	\$5,256,160	\$6,663,632	\$7,572,424	\$8,720,644	\$10,239,024
Peak Time Rebates	\$250,000	\$2,745,000	\$2,959,000	\$5,682,000	\$9,922,000	\$10,075,000	\$9,929,000
Non-Residential Demand Response Program	\$3,469,000	\$4,134,000	\$4,650,000	\$5,579,000	\$6,452,000	\$7,329,000	\$6,908,000
Total Demand Response (as-filed)	\$9,536,000	\$12,801,000	\$14,794,000	\$22,497,000	\$38,329,000	\$40,790,000	\$42,074,000
Total Demand Response (including EFG Additional BYOD)	\$9,756,800	\$16,734,888	\$20,050,160	\$29,160,632	\$45,901,424	\$49,510,644	\$52,313,024

4
5 **VIII. RECOMMENDATIONS**

6 **Q. Please summarize your recommendations to the Commission.**

7 A. My recommendations are as follows:

- 8 1. Direct the Companies to revise the 2022 update so that the scale and scope of their DSM-
9 EE programs are not determined on the basis of deeply flawed analyses. In particular, the
10 Companies should be required to re-assess economic potential using avoided energy and
11 capacity costs that reflect future needs;
- 12 2. As one component of the revised 2022 update direct the Companies to conduct a low-
13 income market characterization study to capture demographic data and characteristics of
14 their lower-income customer segment, similar to a Maryland Low-Income Market
15 Characterization Report prepared for the Maryland Office of People's Counsel in

¹⁰⁹ *Id.*

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1 2018.¹¹⁰ Like the Maryland study, the Companies’ market characterization should
2 “furnish data that can be used to understand the energy affordability issues faced by
3 [Kentucky’s] low-income population and to inform the design of existing and future
4 programs.”¹¹¹ The findings of the study should be used to inform income eligibility
5 criteria and the scale and scope of Income Qualified DSM-EE programs;

6 3. The Companies should also conduct a meaningful analysis of comprehensive home
7 retrofit program design opportunities that includes a rationale analysis of PAYS. Rather
8 than the slipshod program design assumptions included in the cursory analysis conducted
9 by Cadmus, the Companies should work to assess the longer-term benefits of a retrofit
10 program that ramps up to a larger number of customers and appropriately spreads startup
11 and administration costs across them;

12 4. Direct the Companies to develop a new 2024–2030 DSM-EE Plan that ramps up over the
13 period to achieve 1.0% gross energy efficiency savings as a percent of 2021 sales by
14 2027 and maintains a similar level of EE savings through 2030. Program level savings
15 should reflect an equitable balance between residential and non-residential savings
16 opportunities consistent with what I provide in Table 8, reproduced here for convenience
17 as Table 1:

¹¹⁰ Applied Public Policy Research Institute for Study and Evaluation (APPRISE): Maryland Low-Income Market Characterization Report prepared for the Maryland Office of People’s Counsel. October, 2018. <https://opc.maryland.gov/Portals/0/Files/Publications/Reports/APPRISE%20Maryland%20Low-Income%20Market%20Characterization%20Report%20-%20September%202018.pdf?ver=ScReQ-dA9Sk4xlj1V6bp1w%3D%3D>.

¹¹¹ Applied Public Policy Research Institute for Study and Evaluation (APPRISE): Maryland Low-Income Market Characterization Report prepared for the Maryland Office of People’s Counsel. October, 2018, p.i.

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1

Table 12: 2028 Gross EE Savings (Incremental MWh per year) ¹¹²

KU-LG&E Proposed	Income-Qualified Solutions	4,405
	Appliance Recycling	6,057
	Residential Online Audit	4,670
	Business Solutions	134,373
EFG Recommended Additional Savings	Proposed additional residential appliances and lighting	-
	Proposed Additional Residential HVAC	5,000
	Proposed Additional Residential whole house-retrofit	8,000
	Proposed Additional Residential new construction	3,165
	Proposed Additional multifamily	5,269
	Proposed Additional Low-income multifamily	1,514
	Proposed Additional Low-income single family	2,265
	Proposed Additional Low-income low-cost	-
	Proposed Additional Residential behavioral	50,000
	Proposed Additional Business Solutions	73,738
Total KU-LG&E Proposed		149,505
Total EFG Recommended Additional Savings		148,951
Total KU-LG&E/EFG Combined Savings		298,456

2

- 3 5. Direct the Companies to take the required steps to increase combined DLC and Bring-
4 Your-Own Device (“BYOD”) program participation to approximately 250,000 customers
5 in total by 2030. This should be done by proactively enrolling DLC customers in BYOD
6 to circumvent expected attrition from the program as switches fail. These customers
7 represent a ripe target for continued participation in the Companies’ demand response
8 programs and the opportunity to retain them should not be squandered.

¹¹² Data for LG&E/KU Proposed from Bevington Direct, Exhibit JB-1, Table A-1 through Table A-8, at 54–56.

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1 6. To protect customers from the risk of the DSM-EE plan becoming out of date as energy
2 markets change, direct the Companies to file a DSM-EE plan update in 2026, based on a
3 potential study refresh that includes updated avoided costs and re-calculated cost-
4 effectiveness.

5 **Q. Does this conclude your testimony?**

6 A. Yes.