

Pathways to Success in Low-Income Energy Assistance Payment Programs: The Differential Effects of Customer Characteristics and Program Design on Payment Rates

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ABSTRACT

Utilities with low-income energy assistance programs face the challenge of striking a balance between helping customers in need and limiting the financial impact of these programs on the utility companies and rate payers. Due to the complex and mutable set of circumstances that generate the demand for assistance, designing energy assistance programs with high success rates – such as high on-time bill payment rates – is a difficult process requiring a periodic reassessment of program design. The need for high success rates for these programs is clear – higher success rates can help drive down costs per customer, meaning utilities can help a larger number of customers. This paper argues that while the number of factors that determine the success of these programs is manifold, certain customer characteristics and program design aspects can drive higher on-time payment rates and thereby increase a program's cost effectiveness.

This paper provides insights gained from an end-to-end evaluation of an energy assistance program, which uncovered different factors that can influence program success. Our research provides evidence suggesting that certain customer characteristics, such as length of program enrollment or receiving Low-Income Home Energy Assistance Program (LIHEAP) funds, drive success rates differentially. Understanding the impact that customer characteristics and program design can have on the success of energy assistance programs is important for program managers and policymakers alike who are interested in improving the efficiency, both in terms of costs and energy, of energy assistance programs.

Introduction

The Opinion Dynamics Evaluation Team conducted an end-to-end evaluation of a low-income energy assistance program (EAP) (referred to in this paper as the “program”) for an electric utility in the Northeastern United States. A key part of this evaluation was to recommend improvements that could enhance the design and implementation of the program.

To determine a benchmark for how well the program was designed and implemented, we analyzed a number of different metrics, including program costs per customer served, customer satisfaction, and enrollment conversion rates. Upon reviewing these metrics, we realized that we needed to develop another metric that could provide an indication as to whether the program was achieving one of its primary goals, which is for payment-troubled customers to pay their energy bills on time each month. This is an important goal for the program not only because the program is intended to help customers learn how to be self-sufficient but also because program costs are used most efficiently when customers have high on-time payment rates¹. Low on-time payment rates indicate that customers are struggling in the program by missing payments, causing their overdue balances to grow.

To address the main goal of determining whether the program was helping customers to pay their energy bills on time each month, we used a key metric of on-time payment rates to classify successful customers, those who have high on-time payment rates, and unsuccessful customers, those who have low on-time payments rates, and tried to identify customer characteristics that seem to

¹ Opportunity cost associated with the utility carrying arrearages incurred by low-income customers is also a key benefit for utility low income programs however this was not explicitly explored as part of this study.

influence success in the program. Through analyzing on-time payment rates for customers we could both determine how well the program was reaching its goal of helping customers pay their bills on time each month and what factors or customer characteristics are correlated with success in the program.

To answer the question of what factors influence customer success in the program, we developed an analytical approach that attempted to determine whether different customer characteristics seemed to have an impact on success rates in terms of on-time bill payment rates. These characteristics consist of:

- Length of time in the program,
- Enrollment in energy efficiency programs,
- Overdue account balances,
- Energy usage,
- Type of heating, and
- Poverty level.

In our analysis, we analyzed how these characteristics differed between successful and unsuccessful customers.

The analytical approach we used required gaining insights from qualitative data collection activities and a quantitative analysis of the program's data. The process of analyzing the program's data to determine which factors influence program success not only allowed us to use quantitative data to corroborate what we uncovered through qualitative evaluation activities, but also gave us new insights about the program's customer base. The insights gained through a qualitative and quantitative analysis of the program gave us a strong position from which we could make program design recommendations that would increase the program's cost effectiveness. While not covering all aspects of our evaluation, this paper focuses on the analytical process we used in determining the customer characteristics that can influence program success and the insights for program design improvements that we gained along the way.

Overview of Energy Assistance Programs

Utility-run EAPs provide payment-troubled customers financial assistance for their energy bills. EAPs fall under the umbrella of Universal Service Programs, which are programs that ensure the availability of affordable services, such as energy, for low-income communities. The level and range of services offered through these programs differs considerably by state. EAPs can either be administered in house by utilities or through external agencies. The program we evaluated is administered by multiple and varying community-based organizations. These organizations are involved in the day-to-day administration of the program, including processing applications, fielding customer inquiries, and maintaining customer enrollment.

Most EAPs have specific requirements that determine customer eligibility. Since EAPs provide financial assistance to low-income customers, income eligibility tends to be a basic requirement for these kinds of programs. The most common income guideline is 150% of the federal poverty level. Another common eligibility requirement is a payment default. EAPs can be costly, and the default requirement can be a way to limit growth in program enrollment since some utilities have a large number of low-income customers. For these utilities, the default requirement serves as a mechanism to make program benefits available only to customers in need of bill payment assistance, as demonstrated through meeting income requirements and defaulting on monthly payments. The program we evaluated requires that customers be at or below 150% of the federal poverty line, in addition to defaulting on a payment agreement. The utility makes a payment agreement with a customer who has a history of not being able to pay their energy bill. Once a customer breaks this agreement, they become eligible for the program. Notably, this payment agreement requirement tends to serve as a disincentive for the customer to pay bills on time if they know they can default on

it and get more assistance. This requirement also results in more arrearages that the utility must offset. This design flaw was addressed in our recommendations for improvement to the utility.

EAPs typically have one of two monthly bill assistance models: an income-based payment or a discounted rate. Utilities with the income-based payment model offer some form of monthly subsidy or fixed payment, thereby reducing the monthly billed amount, that is determined based on total gross monthly household income and energy burden over a 12-month period. The income-based payment models typically have yearly benefits caps that vary depending on whether the customer has electric or non-electric heat. Utilities with a discounted rate model offer customers discounted energy rates determined by total gross monthly household income. Discounted rate models have usage caps – the discounted rate is offered up to the cap usage amount. Customers are responsible for paying any usage that exceeds the cap at the regular rate. The program we evaluated uses an income-based payment design. The monthly payment amount is assigned during the time of enrollment, which is determined by the customer's gross self-reported gross monthly income, household income, and non-discretionary expenses. Yearly benefits are capped (CAP credits are limited to \$2,160 for heating customers and \$850 for non-heating customers) – if a customer exceeds their benefits cap, they are removed from the program and must reapply after the end of the benefit year.

Many utilities consider debt forgiveness as a key program benefit for customers, where the outstanding debt accumulated by a customer is forgiven in monthly increments, typically over the course of one to three years. For example, debt is forgiven over a three-year period for the program we evaluated, meaning that each month 1/36 of a customer's overdue balance is forgiven, as long as the monthly payment is paid on time and in full. Customers who are attracted to EAPs are often struggling to pay back overdue balances that have ballooned over time – the debt forgiveness feature gives customers an opportunity to eliminate their accumulated debt and achieve good standing with the utility.

Utilities often have requirements that customers must meet in order to maintain enrollment. Customers are typically required to apply to the Low Income Heating Assistance Program (LIHEAP) and weatherization programs. LIHEAP provides customers federal energy assistance funds in addition to EAP benefits. While enrollment in LIHEAP is not a requirement, applying for it is usually required. Similarly, many utilities also require that EAP customers apply for the utility's weatherization program. Weatherization programs typically are designed to help customers reduce their energy bills through energy-efficiency education and the installation of energy-efficient measures. The program we evaluated requires customers to apply for LIHEAP and weatherization services after enrolling in the program. The program is not limited in how many customers receive LIHEAP funds since it is a federal program. The program is limited, however, in how many customers can receive weatherization services, because this is funded separately from the EAP. Weatherization services can be quite cost prohibitive, so very few (less than 1%) EAP customers were able to receive weatherization for their homes in the program we evaluated.

Utilities usually require EAP customers to reapply, or recertify, to the EAP annually or bi-annually. The program we evaluated requires annual recertification. This process is intended to make sure that customers receiving benefits continue to meet eligibility requirements over time. Utilities also tend to use the recertification process to recalibrate monthly benefits in the event that a customer's financial or household situation changes.

Evaluation Methodologies

Our approach to this evaluation involved the use of qualitative data collection activities and quantitative analysis of program data. On the qualitative side, we interviewed program stakeholders and administrators, reviewed program materials, and conducted literature review of other similar programs in the state of Pennsylvania². On the quantitative side, we conducted an analysis of the program's databases.

² See references at the end of this paper

For interviews with program stakeholders, which included utility staff involved in managing the program, we covered topics geared towards gaining an understanding of how the design and implementation of the program is viewed internally. The administrator interviews allowed us to learn how the design and implementation of the program is viewed external to the utilities, by administrators who have intimate knowledge of the program and its customers. In reviewing the program materials, we looked at all program and customer-facing documents to gain an understanding of the program and how it is presented to customers. For secondary research, we interviewed representatives from other utilities involved in the management of energy assistance programs in the Northeastern United States to learn how these programs compared to our client's program in terms of design, benefits, implementation, and energy efficiency education offerings.

We used these evaluation activities to develop a story, from a qualitative perspective, of how well the program was designed and implemented. Through these activities we obtained a lot of anecdotal information about how the customers were performing in the program and how the program should be altered to improve design and implementation. While important, this qualitative information provided only one side of the story. Conducting an analysis of program data gave us an opportunity to further support the findings and recommendations that arose from the qualitative data collection activities.

To analyze the program quantitatively, we developed a master database that contained key components of multiple program databases in order to characterize the program's customers on multiple dimensions³. The data included in the analysis consisted of the following:

- **Arrearage forgiveness data:** These data summarized the amount of debt a customer accumulated before entering the program and the monthly debt forgiven
- **LIHEAP customer data:** These data showed which customers received federal LIHEAP funds
- **Revenue shortfall data:** These data summarized the monthly revenue loss from monthly benefits for each customer in the program
- **Customer status data:** These data provided a record for each time a customer entered and exited the program
- **Monthly payment information:** These data summarized the monthly payment behavior for each customer in the program
- **Weatherization participant data:** These data showed which customers received weatherization services from the utility
- **Monthly electric usage:** These data provided monthly electric usage for each month a customer was in the program
- **Customer financial and demographic data:** These data summarized all financial and demographic information that is obtained at the time of enrollment

The evaluation team aggregated all these databases and analyzed the data to characterize the program's customer base and identify characteristics of successful customers, which we previously specified as those customers who pay their EAP bills on time each month. Customer payment data were analyzed to elicit whether customers' ability to make on-time payments was influenced by specific characteristics (e.g., poverty level and arrearage amount). The customer characteristics we analyzed were selected due to their availability in the program data and their ability to answer research questions that developed from our discussions with the program's managers and the insights we gained through analyzing the program qualitatively.

Using these characteristics, represented by variable in the program data, we developed a profile of successful customers in the program by looking at how the variables differed between unsuccessful and successful customers. The measure of success we used was an on-time payment rate, which we calculated for each customer. This measure created a normalized metric by which all

³ Note that this analysis was only conducted with program participants. A comparison group of non-participants would have been an interesting method however budget did not allow for this experimental design approach.

customers, who had been in the program for different rates of time, could be compared. This rate was calculated simply as follows:

$$\text{On-Time Payment Rate} = \text{Total \# of On-Time Payments} / \text{Total Number of Bill Months}$$

After reviewing previous evaluations of similar programs, it was clear that no industry standard existed for defining success or for evaluation success in these programs. In order to make a determination of what is an unsuccessful and successful customer, we broke on-time payment rates up into deciles. For purposes of this analysis, we defined unsuccessful customers as those who have an on-time payment rate in the bottom two deciles, which translates into an on-time payment rate less than 25%, meaning that less than 25% of EAP payments were made on time, including missed payments. We defined successful customers as those who have an on-time payment rate in the top two deciles, which translates into an on-time payment rate greater than 82%, meaning that more than 82% of EAP payments, regardless of how long a customer was in the program, were made on time.

Table 1. Designation of Unsuccessful and Successful Customers

Group	Payment Rate Decile	On-Time Payment Rate	Number of Customers
Unsuccessful	Bottom two	Less than 25%	17,023
Successful	Top two	More than 82%	16,106

Our approach to the customer profile analysis involved looking at how 11 customer characteristics differed between unsuccessful and successful customers (See Table 2). We ran two-group mean-comparison tests to determine whether the differences in the characteristics between unsuccessful and successful customers were statistically significant. Our analysis of the customer characteristics was informed by the qualitative data we gathered during the interviews and program materials review, as well as the findings suggested by the customer profile analysis.

Table 2. Customer Characteristics Used in the Customer Profile Analysis

Number	Variable	Variable Description	Research Question
1	Weatherization recipient	Indicates whether a customer received weatherization services	What effect does receiving weatherization services have on a customer's success in the program?
2	Average daily electricity usage	Daily consumption terms of kWh	Do successful customers consume less energy than unsuccessful customers?
3	EAP monthly payment amount	The fixed monthly payment customers are required to pay, as determined by the program	Are the monthly payment amounts priced appropriately?
4	Average account balance	The customer's average monthly bill amount, including unpaid balances	What effect does a customer's average account balance have on their success in the program?
5	Income	The customer's self-reported gross monthly income	What impact does a customer's income have on their success in the program?
6	Length of time in the program	The total amount of time a customer was in the program as of the time of analysis	Is the program helping customers learn to pay their energy bills on time each month? Should there be a limit to how long a customer stays in the program?

Number	Variable	Variable Description	Research Question
7	LIHEAP recipient	Indicates whether a customer received federal LIHEAP funds	Are customers who receive federal LIHEAP funds more successful than those who do not?
8	Paperless billing participant	Indicates whether a customer received paperless bills	Are customers who receive paperless bills more successful in the program?
9	Pre-program arrearage balance	The total overdue balance a customer accumulated before entering the program	Does customer's pre-program arrearage balance have an impact on their success in the program?
10	Heating type	Identifies customers who have electric and non-electric heat	Are payments appropriately calibrated for different heat types?
11	Poverty level	The customer's poverty level, determined by the customer's gross yearly income and household size, as specified by federal poverty guidelines	What impact does a customer's poverty level have on their success in the program?

Key Findings from Customer Profile Analysis

The results of the customer profile analysis are located in Table 3. The outcome of this analysis allowed us to develop a profile of a successful customer, which suggests the following:

A successful customer (who pays 82% of their bills on-time) is, on average:

- Twice as likely to have received weatherization services than an unsuccessful customer
- Not likely to have received federal LIHEAP funds
- Likely to have non-electric heat
- Likely to have a pre-program arrearage balance \$400 less than the average
- Likely to have an average account balance roughly \$400 less than the average
- Likely to be in the program longer than 15 months

Table 3. EAP Customer Success Profile⁴

#	Customer characteristic	Unsuccessful	Successful	Difference ⁵	All Customers
1	Weatherization recipient	0.3%	0.6%	-0.3%	0.5%
2	Average daily electricity usage	41 kWh	39 kWh	2 kWh	41 kWh
3	EAP monthly payment amount	\$77	\$75	\$2	\$78
4	Average account balance	\$1,402	\$512	\$890	\$953
5	Gross monthly income	\$1,210	\$1,294	-\$84	\$1,294
6	Number of months in the program	7 months	15 months	-8 months	12 months
7	LIHEAP recipient	38%	12%	26%	27%
8	Paperless billing participant	3%	5%	-2%	4%
9	Pre-program arrearage balance	\$1,560	\$813	\$747	\$1,217
10	Electric heat	51%	31%	20%	41%
11	Poverty level ⁶	2.09	2.31	-0.22	2.23

⁴ Values are represented as averages.

⁵ All differences are statistically significant at a 99% level of confidence.

⁶ This poverty level is on a categorical scale: 1 = 50% or below the federal poverty level (FPL); 2 = 51 – 100% of FPL; 3 = 101- 150% of FPL. In this sense, an increase in this value represents a lower level of poverty.

By looking at the differences between unsuccessful and successful customers on these 11 variables, a story emerged that provided quantitative evidence of factors that correlate with success in the program. This can be summarized as follows:

- Customers appear to be more successful the longer they are in the program, which is not surprising given that customers who do not pay their bills are terminated from the program.
- LIHEAP recipients struggle more in the program than non-LIHEAP recipients. LIHEAP does not necessarily cause customers to be less successful in the program. However, we did find a correlation which is not surprising given how LIHEAP funds are distributed and the lack of communication with the customer as to when they are responsible for their bill payment. LIHEAP recipients tend to be most in need of assistance to pay their energy bills. Further, LIHEAP recipients would receive utility bills in the amount of \$0.00 while LIHEAP funds were allocated. Once LIHEAP funds were exhausted, the customer would spontaneously begin to receive bills where they owed a certain amount but after months of zero balances owed, customers may have become accustomed to not owing anything and would realize they owed something after defaulting and receiving late payment notices.
- Customers with high pre-program arrearage and average account balances tend to be less successful in the program. Therefore, customers who had trouble paying their bills in the past are more likely to have difficulty paying their bills in the program as well.

Insights Gained from the Findings

We used the findings from the customer profile analysis to address the research questions located in Table 2, which were used to inform and support the recommendations to changes in program design we made. The insights gained from the customer profile analysis and the accompanying recommendations for improving the design of the program are outlined below.

Energy Consumption

There does not appear to be much difference in average daily electricity usage between unsuccessful and successful customers. This variable was included in the analysis to determine whether successful customers use less energy. This analysis suggests that energy consumption does not correlate with payment behavior. This makes sense, since the customer's flat monthly payment stays the same regardless of the amount of energy consumed.

The amount of energy consumed in the program relates to one important qualitative insight we were not able to verify through the data analysis: whether energy consumption increases after entering the program. We received comments from different program administrators suggesting that some customers greatly increased their energy consumption after entering the program. Although usage is limited by the yearly benefit caps offered, the amount of energy that these benefits pay for is likely greater than customers typically use. The only way we could quantitatively support the finding that customers use more energy after entering the program would be by conducting a pre-post billing analysis of monthly energy usage using a linear fixed-effects regression model, similar to the models that are used to verify energy savings for energy efficiency programs. This effort was unfortunately outside the scope of our evaluation.

Program managers for other programs should consider a billing analysis as an option, however, to determine how efficiently customers are using energy in energy assistance programs. Despite not being able to verify that energy use increases when entering an EAP, we made the recommendation that the program implement some kind of measure, either through creating monthly usage caps or sending warning letters to customers whose usage increases more than 125% of the baseline usage after entering the program, to help customers learn how to control their energy usage⁷.

⁷Our recommendation suggested higher usage caps during periods of increased energy demands, such as winter and summer.

Since some customers enter EAPs because they use more energy than they can reasonably afford, learning how to use energy more efficiently is an important behavioral aspect to EAPs. Our analysis showed that the program fell short on this front by offering little in terms of energy efficiency education and weatherization offerings. This is understandable, since these offerings are expensive to provide. Due to this, we felt that it would be important to create some type of reoccurring mechanism, such as monthly usage caps, that immediately showed customers the consequences of using too much energy per month.

Recommendation. Although energy consumption does not appear to affect payment behavior, the program should consider conducting a pre-post billing analysis on EAP customers to determine what changes in consumption occur after entering the program. In the interim, the program should consider changes in design that limit the growth in energy consumption after customers enter the program, either through monthly usage caps or by sending warning letters to customers whose usage increases more than 125% after entering the program.

Heat Type

Those customers who do not have electric heat appear to be more successful in the program than those who do. While this applies to this program in particular, it is important to note that this is a program at an electric utility, so the fixed monthly payments are higher for electric heat customers than non-electric heat customers, on average. In this context, the fact that electric heat customers struggle more than non-electric heat customers in paying their EAP bill each could imply that the monthly payment is priced too high for electric heat customers.

Recommendation. The program should conduct additional analysis of how electric heat customers fare in the program. Lower levels of success could be the result of payments being priced too high for electric heat customers.

Pre-Program Arrearage and Average Account Balances

The results from the customer profile analysis strongly suggest that pre-program arrearage and average account balances have a role in determining success in the program. While through this analysis it is not possible to determine the direction of causation, what is clear, however, is that customers who hold high pre-program arrearage and average account balances are less successful in the program than customers who do not. The reasons are manifold: these high balances could be an indication of customers repeatedly coming in and out of the program, customers using their program benefits too quickly, or customers who come into the program with high balances and are not able to consistently pay their bills each month. Whatever the reasons are, we felt that the utility should revisit its program design to address customers who have a pre-program arrearage balance greater than \$1,500 and those who maintain an average account balance greater than \$1,400.

Recommendation. One possible explanation for high balances is that the default requirement is keeping customers out of the program who are in immediate need of assistance. Instead of receiving immediate assistance when a customer demonstrates need based on income, a customer could purposefully accumulate debt before finally qualifying for the program by defaulting on a payment agreement. Due to this, the program should consider removing the default requirement, or at least make exceptions for customers who are extremely financially or payment troubled. The program should also consider whether there should be program changes targeted specifically to customers with high balances to help these customers become more successful in the program.

Income and Poverty Level

We saw little evidence that a customer's income and poverty level have much impact on their success in the program. Gross monthly income is roughly the same for unsuccessful and successful customers. Customers with a slightly lower level of poverty appear to be more successful in the program, although the difference in poverty level between unsuccessful and successful customers is not very appreciable.

Recommendation. None made related to income or poverty level.

LIHEAP Recipients

It seems counter-intuitive that LIHEAP recipients would be less successful in the program than non-LIHEAP customers, since LIHEAP receive additional funds to pay their energy bills. Through our interviews we found that some LIHEAP recipients receive enough benefits from the program and LIHEAP to cover their entire energy bill for many months at a time. Our findings on some of the administrative interviews suggest that some LIHEAP customers have the impression that they no longer have to pay their energy bills and can miss payments once their LIHEAP benefits run out. Alternatively, since customers who qualify for LIHEAP are extremely troubled financially, they may still struggle to pay their bills each month even with the benefits received, assuming the benefits do not cover all their energy costs.

Recommendation. The program should consider developing approaches to improve success rates for LIHEAP customers, possibly through recalibrating payment amounts or by sending LIHEAP customer paper notifications when their benefits are close to being exhausted.

Paperless Billing

The program's managers were particularly interested in what effect receiving paperless bills had on a customer's success in the program. Paperless bills are attractive for utilities due to the cost savings involved. The result of the analysis provided showed that slightly more customers who receive paperless bills are successful than unsuccessful. However, since the use of paperless bills reflects greater engagement with the utility, it is unlikely that receiving a bill in a new format would cause any behavior change.

Recommendation. The program should not actively promote the use of paperless bills since a change in the format of the bill is unlikely to result in any change in payment behavior.

Monthly Payment Amount

It is interesting that the average monthly payment amount is roughly the same for unsuccessful and successful customers, which would indicate that the payment amount is appropriately priced for customers in the program. While this is the case, it contradicts the findings from the heat type analysis that suggests that payments are priced too high for electric heat customers. Since the heat type is not controlled for in the monthly payment amount analysis, on average, it appears that monthly payment amounts are appropriately priced for customers. We know that the monthly payment amount is, on average, \$38 higher for electric than non-electric heat customers. Since heat type has a big impact on determining the monthly payment amount, it is a better measure of success than the monthly payment amount alone.

Recommendation. The program should maintain current payment levels, but additional research should be conducted to determine whether the monthly payment amount is appropriately priced for electric heat customers.

Weatherization

Based on the data analysis, there is some evidence that suggests customers who receive weatherization services are more successful in the program than those who do not. The evidence for this is weak, however, considering that less than 1% of all customers received weatherization services. Additionally, it is unclear what part of the weatherization services is causing customers to be slightly more successful. We do not suspect any opt-in bias, since all customers are required to apply for weatherization services. Weatherization makes customers' homes more energy efficient, but it is unclear how this would make a customer more successful since their monthly energy bill is fixed while in the program. It is possible that the process of receiving weatherization services and the accompanying energy efficiency education is having some effect on customers that makes them slightly more likely to be successful in the program.

Recommendation. The program should consider targeting high-risk customers for weatherization services, including customers with higher than average pre-program arrearage and account balances.

Conclusion

The results of this evaluation emphasized the importance of using quantitative research to support findings from qualitative research. In conducting the data analysis for this evaluation, our evaluation team uncovered additional insights about the program's customer base that we did not learn about through our qualitative research. In conducting the customer profile analysis, we learned that successful customers in this program tend to:

- 1) be in the program longer than 15 months,
- 2) not receive federal LIHEAP funds, and
- 3) carry below average pre-program arrearage and account balances.

While many more insights and recommendations came out of this evaluation than could be discussed in this paper, the outcome of the customer profile analysis produced some surprising and unsurprising results. In the process of evaluating this program, we learned that understanding the characteristics of a program's customer base can yield insights that could help improve program design and success rates. Our hope with this research was that through making recommendations for changes in program design geared towards improving the success of customers, we could help the program reach a larger number of customers while limiting the growth in program costs, allowing the program to achieve opposing goals that do not need to be mutually exclusive.

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