



10 Facts About Electricity Costs for Low-Income Families

The Electricity Cost Burden and Tools for Addressing It

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Introduction

High energy costs represent a significant burden for low-income households in the United States. These households typically spend about one sixth of their income on energy expenses, four times more than the proportion of income spent on energy by other households (U.S. Department of Energy, 2017). Low-income families face many barriers to successfully managing their electricity use and costs. For example, they often do not have access to sufficient credit or discretionary income; 53% of borrowers in the U.S. take out their first payday loan to cover regular expenses like utility bills (Pew Charity Trusts, 2012). The U.S. Energy Information Administration (EIA) recently found that 31% of U.S. households struggle to pay the costs of meeting energy needs (Berry et al., 2018). Despite the existence of programs to help low-income households pay their utility bills, only a fraction of those eligible ultimately receive assistance.

This report presents findings from our analysis of low-income Commonwealth Edison (ComEd) customers in northern Illinois, including Chicago. It is organized into two main sections. The first section describes the energy experiences of and challenges facing low-income households (e.g., how much electricity they use, their bill amounts and payment patterns, and disconnection risk). The second describes various programs, regulations, and household strategies aimed at reducing the energy burden for low-income households, such as the Low Income Home Energy Assistance Program (LIHEAP) and other forms of direct assistance, regulations around late payment fees, deferred payment agreements (DPAs), etc.

There are a wide variety of programs and strategies that ComEd's low-income customers use to manage their bills, including utility programs; federal, state, and utility assistance; utility policies protecting low-income households (e.g., fewer late fees); and reducing energy use. However, these households still struggle to pay their bills consistently and on time, and are frequently at risk of disconnection. We conclude that this population needs two types of assistance: (1) help in reducing bill amounts to within a reasonable energy burden, potentially via energy efficiency and conservation, dynamic rates, or in other ways; and (2) bill smoothing or other financial mechanisms to reduce the impact of volatility of bill amounts throughout the year. This report aims to shed light on the experience of low-income households and programming designed to assist them, and can help inform the design of future energy programs targeted for low-income households.

About the Data

We analyzed the electricity use and bill management patterns of low-income households using anonymized data from more than 175,000 Illinois households on income-based energy assistance programs. This unique data, provided by ComEd, covers more than 1.3 million bills and 6.8 million financial transaction records over a 13-month period (June 2015 to June 2016). ComEd, the largest electric utility in Illinois, serves the northern Illinois area, including Chicago, covering 20% of the land area and 70% of the population in Illinois. Income-based energy assistance programs include LIHEAP, Percentage of Income Payment Plan (PIPP), ComEd's Residential Special Hardship program, and ComEd Helps Activated/Disabled Military Personnel (CHAMP).

While these data can provide very detailed information about this population, it is important to note that low-income households are diverse, and the results may not be applicable to other geographies or populations. The data only include low-income households receiving assistance or otherwise identified as low-income in ComEd's internal data systems. Due to funding limitations, LIHEAP and other assistance programs only reach about 24% of eligible households, so the results may not be representative of the approximately 794,000 customers that are eligible for assistance in ComEd's service territory. Additionally, although the results are consistent with research at the national level, these data are specific to the ComEd service territory in northern Illinois.

These data represent three levels of aggregation. The first is an account-level dataset that includes fields such as bill group (defined by what days of the month customers receive their bills), tariff rate (ComEd residential, ComEd's Hourly Pricing, or an alternative retail electric supplier) and tariff class (single-family, multifamily, single-family space heat, or multifamily space heat), and indicators for low-income assistance programs. The second is a month-level dataset, which includes bill generation and due dates, monthly charges (including previous unpaid amounts that are not part of an active DPA) and kWh use, and indicators for various actions taken by the utility company (e.g., disconnection notices and other service contacts). The third is a transaction-level dataset that includes the date, purpose, debit or credit amount, and payment method for each transaction. We merged these three levels of data together for analysis using anonymous customer identifiers and bill due dates.

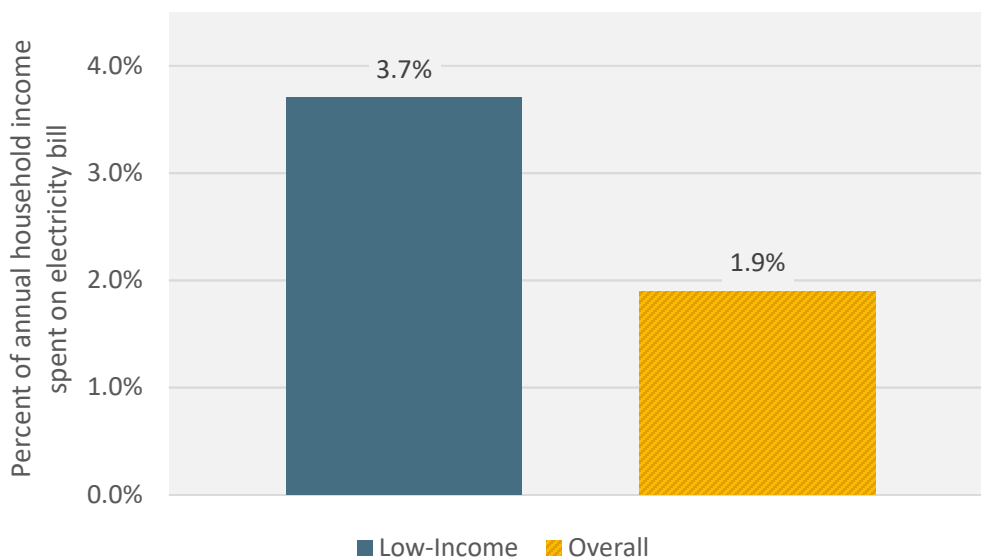
The Electricity Costs of Low-Income Families: Evidence from Northern Illinois

Low-income families in Chicago and the surrounding area struggle to pay their electricity bills in full and on time, becoming vulnerable to a cycle of missed payments, late fees, and shut-off notices. They use a variety of strategies to manage their electricity bills, including budget billing, DPAs, low-income assistance programs, and conservation. In this section, we start by describing the challenges and cycle of hardship these customers face and then discuss the approaches they can use to address those challenges in the second section.

1. The electricity burden for low-income households is almost double that of the average Illinois household.

Low-income households, defined as households with income at or below 150% of the federal poverty line, account for about 24% of all ComEd customers. Their average annual ComEd bill is estimated to be around \$1,100, which is similar to the average annual electricity cost for Illinois households at \$1,142 (Elevate Energy, 2017). Thus, for low-income Illinois households earning \$30,000 or less, 3.7% or more of their annual income is spent on electricity. Meanwhile, the same electricity bill represents 1.8% of Illinois’s annual median household income (see Figure 1 below).¹ Note that ComEd bills cover only electricity costs and do not account for the full energy burden for most low-income households, which also includes gas.

Figure 1. Household Electricity Burden in ComEd Territory: Low-Income vs. Overall



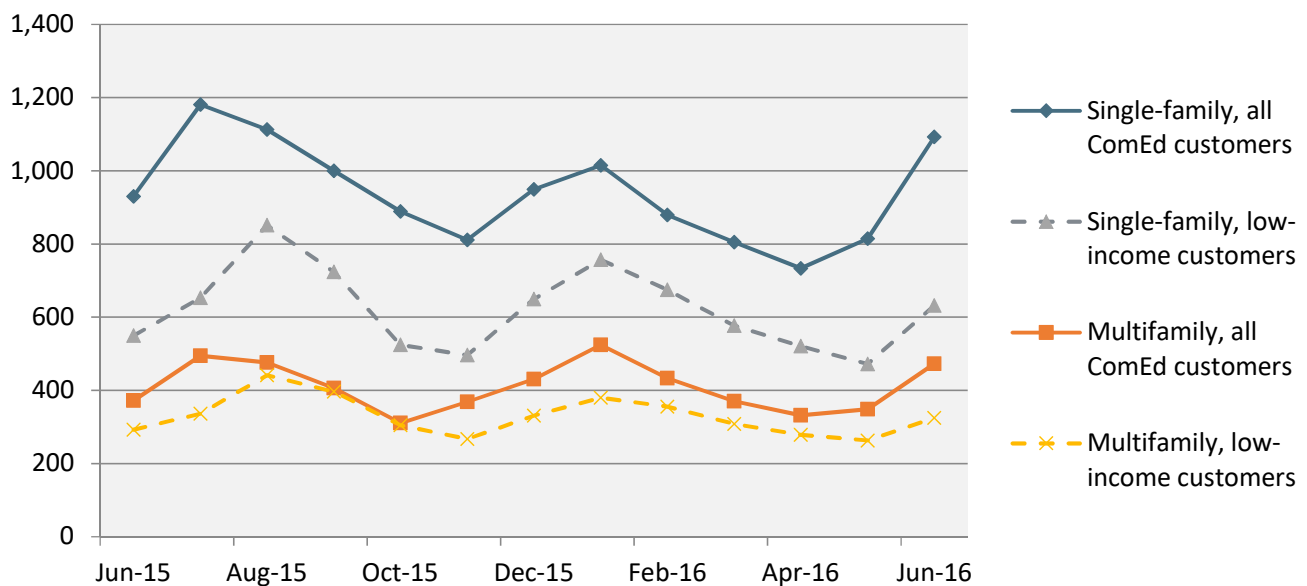
¹ Estimated based on 2016 American Community Survey data and the regional demographics profiles found on ComEd’s official website. This is corroborated with 2017 Energy Information Administration data that an average household in Illinois spends 1.7% of their income on energy.

2. Low-income customers use less electricity than average.

Among low-income customers, average annual electricity use for single-family households is 37% less than the average for all ComEd single-family customers, while low-income multifamily households use 13% less than the average multifamily customer. Overall, the summer and winter use for all households in our sample are similar, approximately 700 kWh per month, which is 122 kWh higher than their average monthly spring and autumn use (see Figure 2 below).

Disaggregating single-family and multifamily households, we observe a larger peak in the summer in single-family household electricity use, while multifamily household electricity use has similar, smaller peaks in the winter and summer. One possible explanation for this pattern is that single-family homes tend to be larger and are more likely to have air conditioning (which uses electricity as the main source of cooling) than multifamily homes (EIA, 2013). However, the summer peak for single-family low-income households is still smaller than the peak for all single-family households, indicating different electricity use patterns for these customers, and potentially different behaviors. Single-family and multifamily electricity use have more similar peaks during the winter months. This pattern could be due to fewer low-income households having access to air conditioning compared to higher income households as well as heating needs being met by a wider variety of fuel sources (e.g., electricity, natural gas, fuel oil).

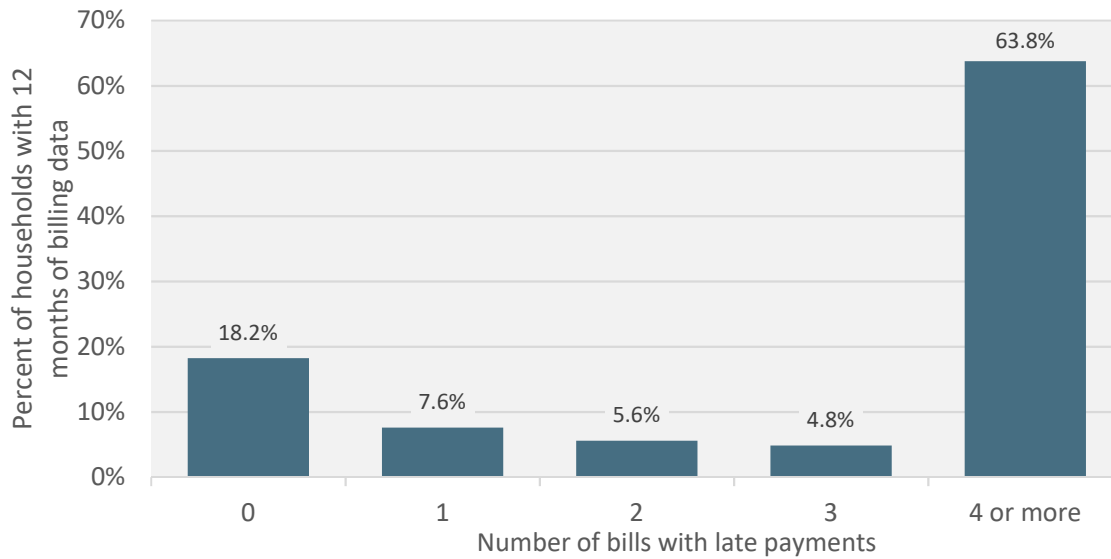
Figure 2. Average Monthly Electricity Use (kWh)



3. More than four in five low-income households make at least one late payment a year, and those households pay late almost two-thirds of the time.

Among households in our sample for which we have twelve months of billing data, 82% made at least one late payment between June 2015 and June 2016, which is more than four in five households (see Figure 3 below). Among households with at least one late payment, late payments were made on almost 60% of their bills, on average. This highlights that households making late payments are likely to make repeat late payments.

Figure 3. Percent of Households with Late Payments

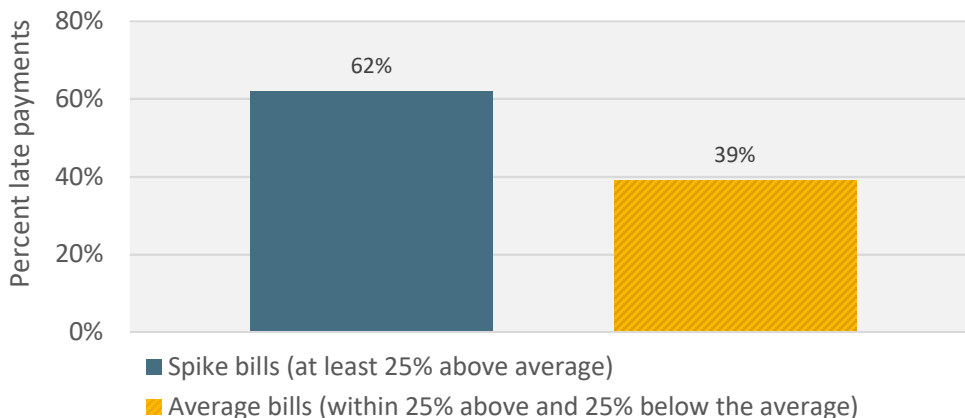


These late payments typically do not result in late fees (see more in Section 6 below). ComEd waives the first late fee per year for each customer and waives additional late fees for customers identified as low-income at the time their payment becomes overdue. However, if a payment is overdue by several months, or if a customer builds up a large overdue balance, this can result in additional costs. For example, if a customer’s account is sent to collections, this will be marked on their credit report and will reduce their credit score.

4. Higher than average bills are less likely to be paid on time.

Due to higher electricity use during summer and winter months, households are more likely to experience summer and winter bill spikes, which are bills that are 25% above the household’s monthly average bill amount. Bill spikes are common: customers experience spikes in 13% of bills (one to two bills a year) on average. This volatility in bill amounts can create payment challenges for households with fixed incomes, tight budgets, or unpredictable incomes. Late payments are more common for bill spikes compared to average bills (see Figure 4 below), and qualitative evidence suggests that low-income customers often find it hard to juggle the different bills that must be paid during seasons when energy bills are high (Hernández and Bird, 2010).

Figure 4. Percent of Late Payments for Bills Spikes Versus Average Bills



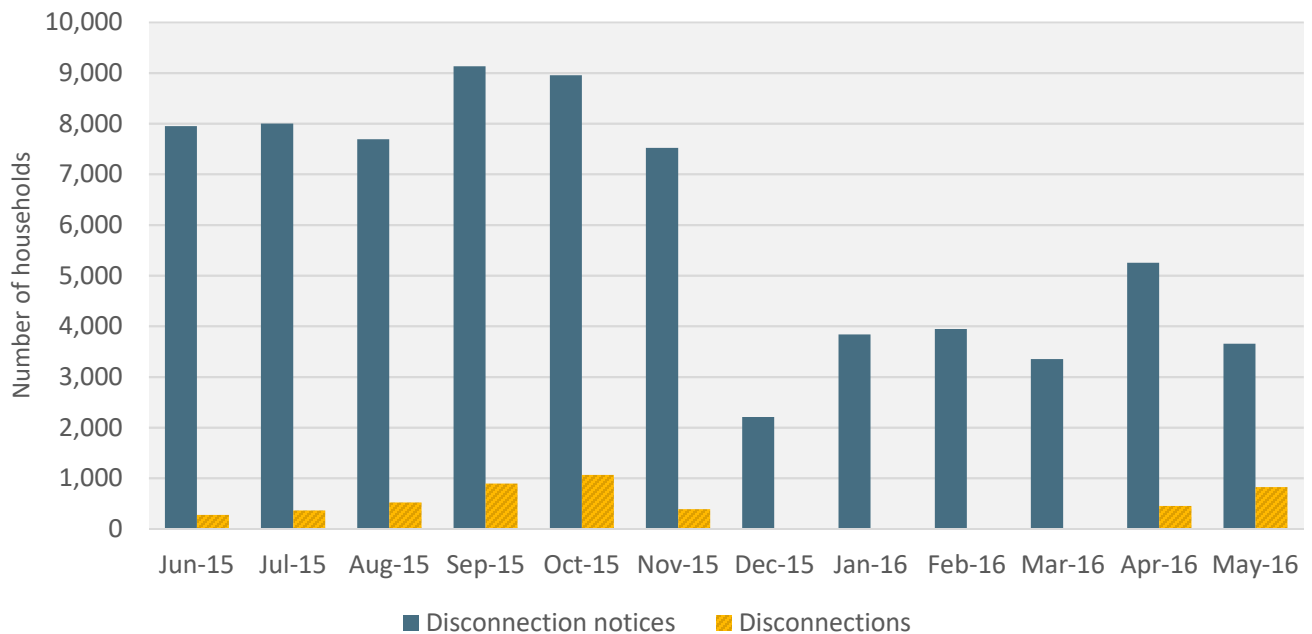
There are several possible explanations for this pattern of late payments, including:

- Higher than average bills create budgeting challenges and customers are unable to pay them on time.
- Customers strategically smooth their payments by delaying paying their electricity bills during high-use months and pay these outstanding amounts off during low-use months. The cost of accumulating arrears in the winter is especially low as ComEd and gas utilities cannot penalize households with disconnections during cold weather in the winter months, and many of these customers can use their Earned Income Tax Credit (EITC) which is received in the early spring to pay down the arrears they accumulated in the winter (Mendenhall, 2012).
- Moreover, customers may delay paying off summer electricity bill spikes and prioritize catching up on their gas payments instead (on which they might be late since the winter) to reconnect their gas service and ensure they are not shut off before the next winter begins (Desmond, 2016).
- A LIHEAP payment might appear late because it can take several months to post to a customer’s account. Almost 16% of non-spike bills in our dataset were paid with LIHEAP but almost 30% of the spike bills were paid with LIHEAP.

5. One in four households receive disconnection notices.

Twenty four percent of households received a disconnection notice during the 12 billing months from June 2015 to May 2016, and 16% of households received more than one notice. This is higher than national trends for the same time period; in 2015, just under 15% of households nationally received disconnection notices for their energy bills (EIA, 2015). While receiving a disconnection notice does not immediately result in a disconnection, it is an indicator of energy insecurity as it represents a higher risk of losing electricity service. For households that are actually disconnected, the costs can be extremely high, including the risk of eviction (Desmond, 2016). Four percent of households actually experienced a disconnection over our sample period (about 7,000 households).

Figure 5. Disconnection Notices and Disconnections by Month



There are several possible explanations for the low disconnection rate compared to disconnection notices. Regulations on disconnections including temperature- and date-based restrictions reduce the number of disconnections that ComEd carries out during the colder months (see Figure 5 above). For example, ComEd does not disconnect customers when temperature is forecasted in the next 24 hours to be below 32°F or above 95°F, and ComEd's approach is to work with customers to address payment issues and actively try to avoid disconnecting their customers. Moreover, disconnections by public utilities such as ComEd that are regulated by the Illinois Commerce Commission (ICC) are subject to additional hurdles during the period of December 1 to March 31 (indeed, no household in our sample was disconnected during this period). These regulations limit when households can be disconnected, but this alone cannot explain the large gap between notices and disconnections. There are also regulations stipulating procedures through which ComEd must go before disconnecting a household for non-payment, including issuing disconnection notices and warning calls before the disconnection (Citizens Utility Board, 2018). This gives households time and opportunity to prevent a disconnection by making a payment, entering a DPA, or seeking assistance. For example, households with disconnection notices are more likely to have entered into a DPA, so these households may be using that option as a strategy to prevent disconnection. Thirty seven percent of the households with disconnection notices entered a DPA, whereas only 6% of the households without disconnection notices entered a DPA. The adoption of a DPA by households that have received disconnection notices potentially accounts for part of the gap between disconnection notices and actual disconnections.

Tools for Reducing the Electricity Cost Burden

Low-income households use a variety of tools and strategies to cope with the electricity cost burden and payment challenges described above, including enrolling in assistance programs and making strategic decisions based on regulations around late payment fees and disconnections. Some of these methods include:

- Delaying payment and potentially incurring late payment fees, which are low and often waived for ComEd's low-income customers.
- Arranging DPAs.
- Enrolling in state, federal, or utility assistance programs, such as LIHEAP or ComEd's Residential Hardship program.
- Changing behavior, such as conserving energy or shifting electricity use to off-peak hours on time-variant pricing schemes.

Additionally, customers can tap into other strategies that our data cannot provide insights into. Other possible strategies include:

- Customers can enroll in budget billing to avoid volatility and the shock of high bills. This opt-in program enables households to pay the same amount each month based on past use patterns, thus smoothing electricity costs over the year. However, this program is only available for households that can pay their bills on time, since utilities can remove a customer from budget billing if they do not pay on time consistently or if a payment is more than 21 days behind.
- Customers can manage electricity rates, such as by enrolling in real-time pricing programs or changing electricity suppliers. For example, customers who enroll in ComEd's Hourly Pricing typically save 15% on the electricity supply portion of their bill, or an average of \$109 per customer in 2017 (Elevate Energy, 2018). These price savings arise because the real-time hourly market price for electricity is often lower than ComEd's fixed price rate, and customers can shift their use to lower priced times of day to increase savings. Analysis of use patterns has found that the vast majority of customers, including low-income customers, could save money by switching to this rate without changing their behavior (Zethmayr and Kolata, 2017; Elevate Energy, 2015). The benefits of real-time pricing have been empirically demonstrated as well, including for low-income customers (Wolak, 2011; Allcott, 2011; Faruqui et al., 2010).

The previous section shows that ComEd's low-income customers still struggle to pay their bills consistently and on time despite the availability of these strategies and tools. This section discusses how the impact of these strategies can nonetheless be substantial.

6. Low late fees minimize direct costs from late payments.

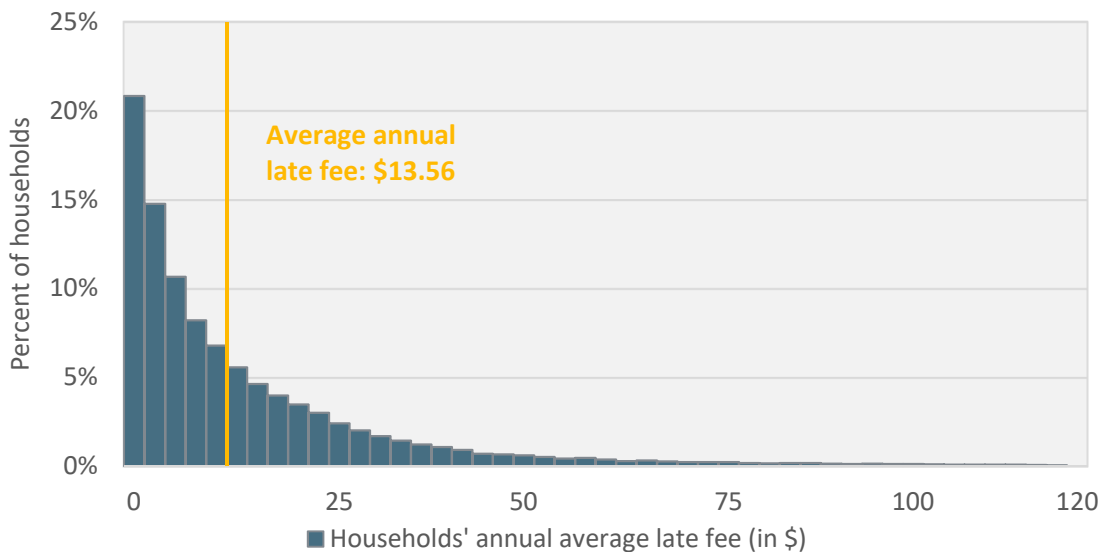
The actions of Illinois utilities (e.g., when they can disconnect service and the fees they can charge for late payments) are highly regulated by the ICC. For Illinois utility customers, late payment fees are set at 1.5% per month of an outstanding bill, excluding accumulated late fees, equivalent to an annual percentage rate (APR) of 18%. Considering that the first late payment in each calendar year is waived by ComEd, and additional late fees are waived for qualified low-income customers, the actual APR on late fees would be lower. This is a

considerably lower rate than, for example, using a payday lender to borrow funds to pay utility bills. The finance charge to borrow \$100 can range from \$15 to \$30 for two-week payday loans, suggesting an APR of about 400% to 800% (Consumer Federation of America). The APR on ComEd late fees is similar to APRs for credit cards in the U.S. in 2018, which average around 14% to 15%, with higher rates for consumers with worse credit (Board of Governors of the Federal Reserve System).

Despite the prevalence of late payments discussed in the previous section, only 29% of households in our dataset incurred late fees between June 2015 and June 2016. Among the households that incurred late fees during this period, the average annual late fee is only \$13.56 (see Figure 6 below).

These low fees enable low-income households to use late payments and arrears to manage month-to-month changes in income and unexpected or irregular expenses, and thus more easily manage regular expenditures like housing and food or reduce the need for high-cost loans, borrowing from friends or family, or other arrangements. Additionally, households facing high gas bills in the winter can use the same strategy by accruing arrears on their energy bills when there's less risk of disconnection and paying down the balance with the EITC on their tax return.²

Figure 6. Average Household Late Fee per Year³



² Data from a 2015 study found that 55% of EITC recipients put any of their refund towards debt or paid past due bills (Despard et al., 2015).

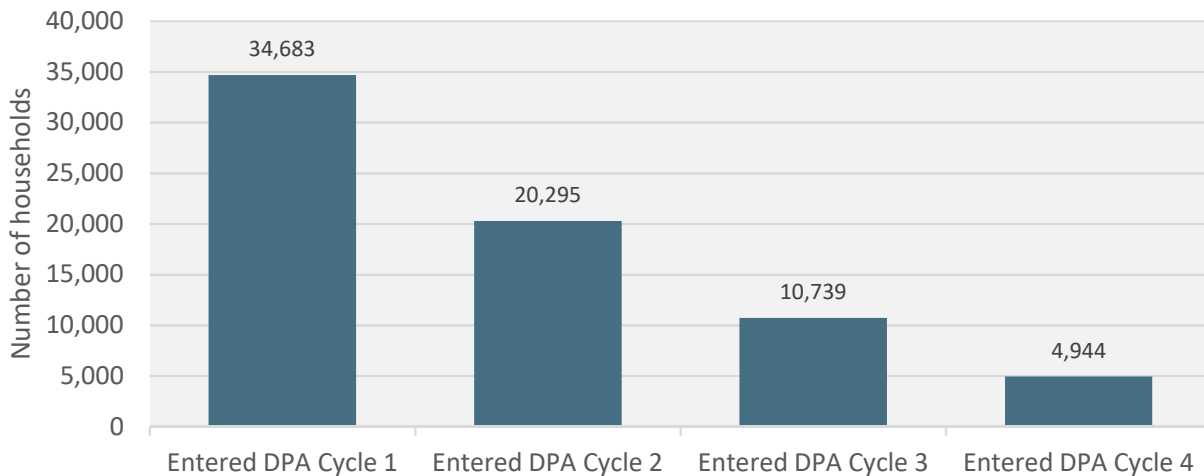
³ The graph removed outliers (first and 99th percentiles). The minimum value (before removing the outliers) is less than \$0.01.

7. Deferred Payment Agreements are another tool for managing utility bills and avoiding disconnection.

Customers who have trouble paying their bills can arrange an agreement with ComEd in which they pay an initial down payment followed by a fraction of the past due amount in installments each month. DPAs are prevalent among U.S. utility companies.

ComEd low-income households’ maximum down payment is 20% of the past due amount, and the length of agreement is between six and 12 billing months. After the first two payments, low-income customers can ask to renegotiate the agreement if they are unable to keep up with the payments. ComEd may consider a DPA to be in default when a customer fails to pay the full amount of the installment plus their current bill on time. When this happens, the customer can renegotiate to enter another DPA cycle. If they default on the second cycle, they may enter a third cycle of this DPA, and so on, until the amount is paid off. In our dataset, about one in five households entered into a DPA between June 2015 and June 2016. Of these, almost 60% of households had more than two DPA cycles (see Figure 7 below). While no distinction is made in the data between entering a new DPA and renegotiating an existing DPA, the timing and amounts of the subsequent DPA cycles suggests that these are likely the same DPA agreement being renegotiated multiple times. DPAs therefore appear to be another strategy that households use to manage their utility bills and avoid disconnections.

Figure 7. Number of Households by DPA Cycle



8. One in five LIHEAP-eligible households actually receive energy assistance.

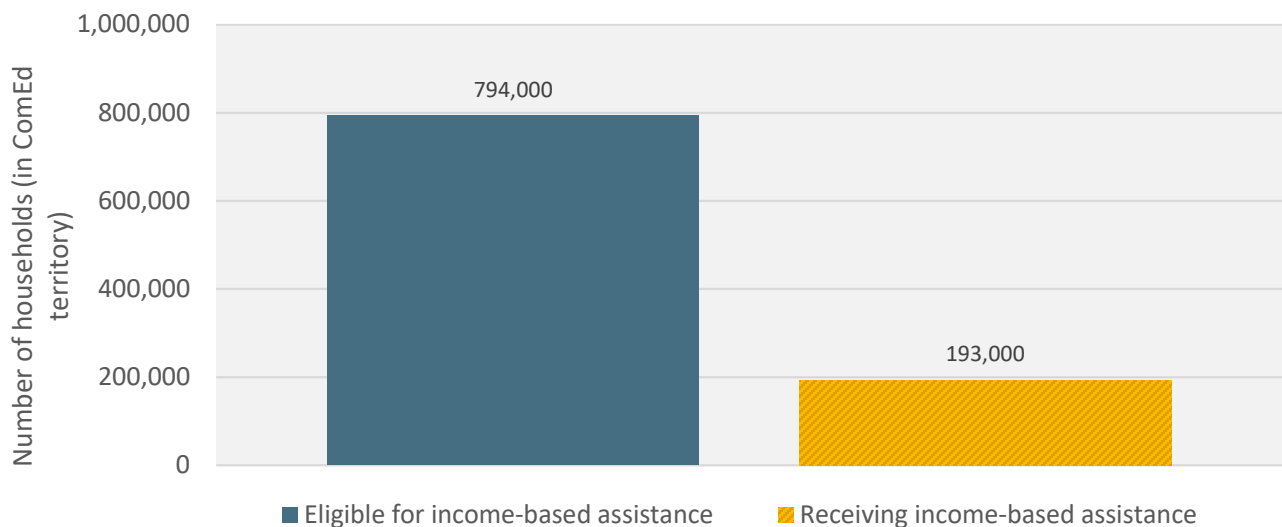
Since 1981, LIHEAP has distributed funding to states, territories, and tribal governments, which in turn use the funds to help low-income households with home heating and cooling costs (Administration for Children and Families, 2016). To be eligible for LIHEAP assistance in Illinois, a family must earn below 150% of the federal poverty level, about \$30,000 annually for a family of three. The median annual income of a typical three-person family receiving LIHEAP assistance is less than \$17,000 (ibid). In addition to LIHEAP, there are state and utility programs. The state program in Illinois is PIPP and has the same eligibility criteria as LIHEAP, and ComEd offers Residential Special Hardship, CHAMP, and other programs with different eligibility criteria. This report focuses on customers receiving LIHEAP, which is the largest program in our sample.

LIHEAP funding must be appropriated annually by Congress. Nearly 9 million U.S. households (23 million people) received LIHEAP funds in FY 2011 when the funding level was \$4.7 billion. However, in recent years, LIHEAP funding has been substantially cut. LIHEAP funding was less than \$3.39 billion for FY 2017, forcing states to drop families from the program, reduce benefits, or both (Edison Electric Institute, 2017). State and utility programs also have limited annual funds. PIPP is funded through a meter charge paid by utility customers, while ComEd agreed on set funding for its assistance programs as part of the 2012 smart grid legislation (Low Income Home Energy Assistance Program Clearinghouse, 2016).

For LIHEAP and the state and utility programs, there is a finite pool of funds each year, which is generally allocated on a first come, first served basis to eligible families. As a result, assistance funds often run out quickly and the programs stop taking applications before they are able to serve everyone eligible (Administration for Children and Families, 2016). In 2015, about 794,000 of the 3.37 million households served by ComEd were eligible for income-based energy assistance programs.⁴ However, only around 193,000 (approximately 24%) of these eligible households actually received assistance or were enrolled in assistance programs as of June 2016 (see Figure 8 below).⁵

While state and federal programs are available to everyone who meets the income eligibility criterion, utility assistance programs are typically only offered to customers who are behind on their bills. LIHEAP also provides greater assistance to customers who are behind on their bills; up to an additional \$750 in LIHEAP assistance is available to customers at risk of imminent disconnection. Thus, in order to access most utility programs and larger LIHEAP assistance amounts, a customer must accumulate arrears and risk lowering their credit scores if their account falls into collections.

Figure 8. ComEd Households Eligible for and Receiving Income-Based Energy Assistance in 2016



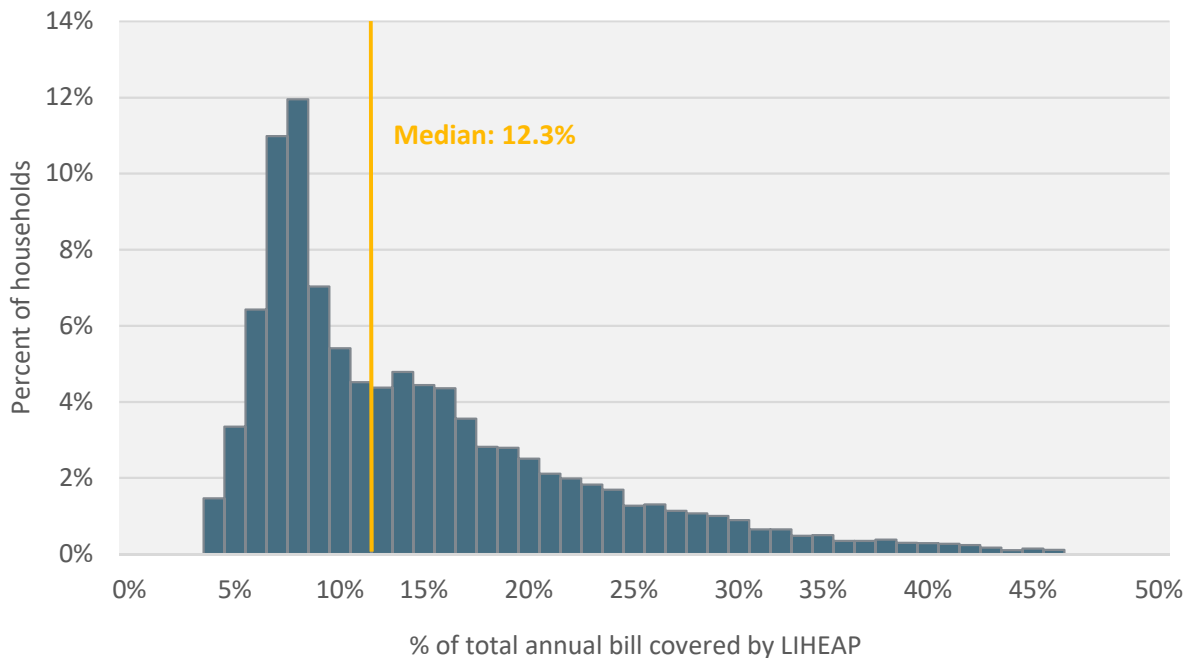
⁴ This is based on estimates conducted by Elevate Energy using the LIHEAP eligibility criterion and data from the 2015 American Community Survey 5-year Estimates.

⁵ This includes LIHEAP as well as state and ComEd assistance programs: ComEd Residential Special Hardship, CHAMP, Percentage of Income Payment Plan (PIPP), and other types of utility ad hoc or program assistance.

9. LIHEAP covers about 12% of annual bills for those who receive it.

Of the 19,833 households in our sample with 12 months of billing data, the mean amount of total annual bill charges is \$1,255 (excluding late fees; median is \$1,141). Among these households, 13,722, or about 69%, have received LIHEAP payments. Their mean LIHEAP payment amounts to \$173 for 12 months, with a range of \$39 to \$673. Half of the households that received LIHEAP payments received assistance to cover 12.3% or less of their ComEd bills (see Figure 9 below). This illustrates a potential gap between households’ electricity cost burden and the amount of LIHEAP funds available.

Figure 9. Total Annual LIHEAP Payment as a Percentage of Annual Electricity Bill⁶



10. Sixteen percent of electricity bills are fixed costs. Low-income households can conserve to reduce the other 84% of the bill.

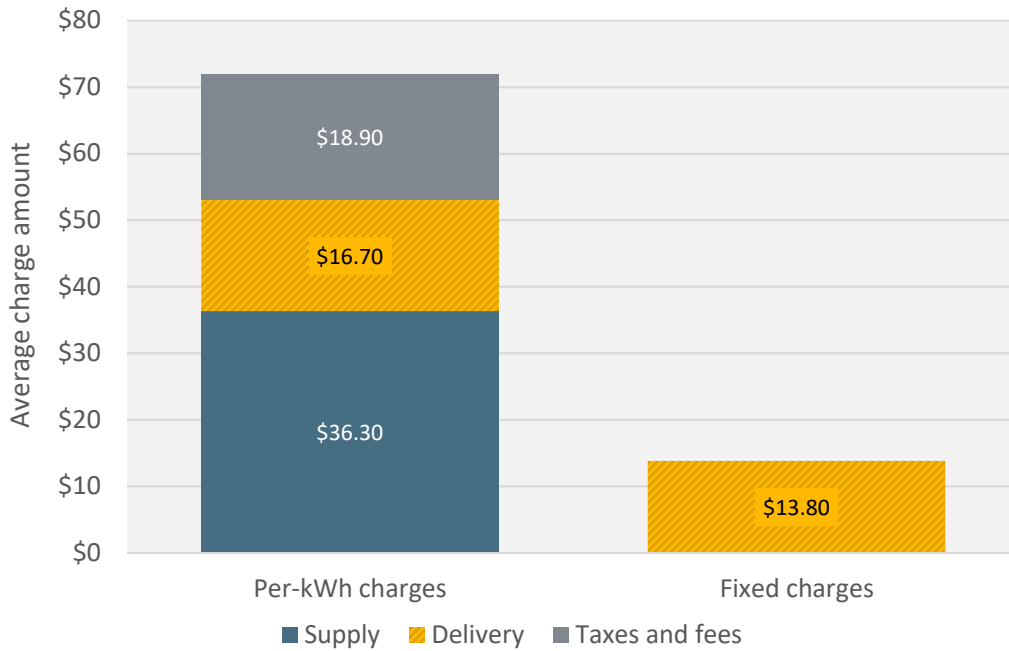
The average low-income customer in our dataset uses 544 kWh of electricity per month at a cost of \$86; in comparison, the average ComEd residential customer uses 753 kWh per month. Approximately \$14, or 16% of the bill, represents fixed charges independent of electricity use (see Figure 10 below). The remaining 84% of the bill can be lowered by reducing electricity consumption or choosing a lower per-kWh electricity rate.

A ComEd bill consists of three components: supply charges, delivery charges, and taxes and fees. Supply charges are calculated on a per kWh basis. When shopping for electricity, customers can compare the per-kWh supply charges (called the “price to compare”) among different energy supply companies and choose suppliers offering

⁶ The graph removed outliers (first and 99th percentiles).

different rates.⁷ Delivery charges include fixed amounts for the customer and metering charges, plus a small component calculated on a per-kWh basis. Taxes and fees are calculated on a per-kWh basis.

Figure 10. Composition of an Average Household’s Electricity Bill on ComEd Flat Rate



⁷ Fifty seven percent of households are on ComEd’s flat rate and 43% are on alternative retail electric suppliers (ARES). The bill compositions for ComEd flat rate and ARES rate customers are slightly different, but these patterns do not change substantively if we look at customers on ARES rates in our dataset.

References

- Allcott, H. 2011. "Rethinking Real-Time Electricity Pricing." *Resource and Energy Economics* 33(4): 820-842.
<https://doi.org/10.1016/j.reseneeco.2011.06.003>
- Berry, C., C. Hronis, & M. Woodward. September 2018. One in three U.S. households faces a challenge in meeting energy needs. U.S. Energy Information Administration.
<https://www.eia.gov/todayinenergy/detail.php?id=37072>
- Board of Governors of the Federal Reserve System. Consumer Credit – G.19.
<https://www.federalreserve.gov/releases/g19/current/>
- Citizens Utility Board (CUB). 2018. Gas and Electric Guide: A Handbook for Residential Gas and Electric Customers in Illinois. <https://citizensutilityboard.org/blog/2018/12/11/cubs-new-gas-electric-guide/>
- Citizens Utility Board (CUB) and Environmental Defense Fund (EDF). 2017. The Costs and Benefits of Real-Time Pricing. <https://citizensutilityboard.org/wp-content/uploads/2017/11/RealTimePricingSummary.pdf>
- Consumer Federation of America (CFA). Payday Loan Consumer Information.
<http://www.paydayloaninfo.org/facts>
- Despard, M. R., D. C. Perantie, J. Oliphant, & M. Grinstein-Weiss. 2015. Do EITC recipients use their tax refunds to get ahead? Evidence from the Refund to Savings initiative (CSD Research Brief No. 15-38). St. Louis, MO: Washington University in St. Louis, Center for Social Development. <https://doi.org/10.7936/K7610ZV7>
- Desmond, M. 2016. *Evicted: Poverty and Profit in the American City*. New York: Penguin Random House.
- Edison Electric Institute. July 2017. Keeping Energy Affordable: Electric Companies Support the Low Income Home Energy Assistance Program (LIHEAP)
http://www.eei.org/issuesandpolicy/liheap/Documents/Keeping_Energy_Affordable_LIHEAP.pdf
- Elevate Energy. 2018. ComEd's Hourly Pricing Program: 2017 Annual Report.
<https://www.icc.illinois.gov/docket/files.aspx?no=15-0602&docId=270438>
- Elevate Energy. 2017. Energy burden in Illinois. https://www.elevateenergy.org/wp/wp-content/uploads/Energy-burden-in-Illinois_final.pdf
- Elevate Energy. 2016. ComEd Hourly Pricing Performance vs. Fixed-Price Rate During 2014.
<http://www.elevateenergy.org/wp/wp-content/uploads/HourlyvsFlatPrice-2016-05-31-FINAL.pdf>
- Elevate Energy. 2015. ComEd Hourly Pricing Performance vs. Fixed-Price Rate During 2013.
<https://www.elevateenergy.org/wp/wp-content/uploads/HourlyvsFlatPrice-2015-09-25-FINAL.pdf>
- Faruqui, A., S. Sergici, & J. Palmer. 2010. The impact of dynamic pricing on low income customers. Institute for Electric Efficiency Whitepaper.

- Hernández, D., & S. Bird. 2010. "Energy burden and the need for integrated low-income housing and energy policy." *Poverty & Public Policy*, 2: 5-25. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4819257/>
- Low-Income Home Energy Assistance Program Clearinghouse. November 2016. State PBF/USF History, Legislation, Implementation. <https://liheapch.acf.hhs.gov/dereg/states/illinois.htm>
- Mendenhall, R., K. Edin, S. Crowley, J. Sykes, L. Tach, K. Kriz, & J.R. Kling. 2012. "The Role of Earned Income Tax Credit in the Budgets Of Low-Income Households." *Social Service Review* 86(3): 367-400.
- Office of Community Services of ACF. January 2016. LIHEAP Frequently Asked Questions for Consumers <https://www.acf.hhs.gov/ocs/resource/consumer-frquently-asked-questions>
- The Pew Charity Trusts. July 2012. Payday Lending in America: Who Borrows, Where They Borrow, and Why. http://www.pewtrusts.org/~media/legacy/uploadedfiles/pes_assets/2012/pewpaydaylendingreportpdf.pdf
- U.S. Energy Information Administration (EIA). March 2013. Homes Show Greatest Seasonal Variation in Electricity Use. <https://www.eia.gov/todayinenergy/detail.php?id=10211>
- U.S. Energy Information Administration (EIA). 2015. One in Three U.S. Households Faced Challenges in Paying Energy Bills in 2015. <https://www.eia.gov/consumption/residential/reports/2015/energybills/>
- U.S. Department of Energy (U.S. DOE). May 2017. Weatherization Assistance Program. https://energy.gov/sites/prod/files/2017/05/f34/wap_factsheet_08.2017.pdf
- Wolak, F. A. 2011. "Do Residential Customers Respond to Hourly Prices? Evidence from a Dynamic Pricing Experiment." *American Economic Review: Papers & Proceedings* 101(3): 83-87. <https://doi.org/10.1257/aer.101.3.83>
- Zethmayr, J. & D. Kolata. 2017. *The Costs and Benefits of Real-Time Pricing: An empirical investigation into consumer bills using hourly energy data and prices*. Citizens Utility Board and Environmental Defense Fund. https://citizensutilityboard.org/wp-content/uploads/2017/11/20171114_FinalRealTimePricingWhitepaper.pdf