MUNICIPAL UTILITY FEASIBILITY STUDY

FOR THE CITY OF CHICAGO

REACH LAB

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1. EXECUTIVE SUMMARY

The expiration of the City of Chicago's 30-year franchise agreement with the investor-owned utility (IOU) Commonwealth Edison has renewed calls for establishing a municipal electric utility (MEU) to serve the city's electricity needs. In August 2020, a preliminary feasibility study commissioned by the City was released by utility management consulting firm NewGen Strategies and Solutions, LLC, ultimately recommending against municipalization. The present study authored by REACH was undertaken on a pro bono, volunteer basis to provide a response to the NewGen study and an outside perspective on the municipalization debate.

Key findings are summarized below:

- NewGen and REACH's estimates show net savings of $1.2-5.9 billion for an MEU over the next 50 years.
- An MEU's rates could average 12% lower over an equivalent period
- Chicago has foregone ≈$6.7 billion in potential income by not municipalizing in 1990.
- Were Chicago to municipalize, it could capitalize on historically low interest rates and emerging classes of financial products designed for resilient public infrastructure.

The present study briefly examines the legal and historical context for municipalization, as well as current metrics and future projections for Chicago which are relevant for subsequent analysis. The current debate is compared to the similar one held in Chicago prior to the last franchise renewal in 1990. The study then conducts an independent financial analysis of the costs of municipalization and compares this to the analysis and claims of the DemocratizeComEd and NewGen studies.

The findings indicate estimates by both NewGen and REACH demonstrate cost savings from an MEU over the next 50 years, with REACH's estimates showing more pronounced savings due to conservative estimation of load growth. Additionally, beyond delivery rate, other pathways exist for an MEU to achieve overall cost savings compared to an IOU: primarily, exemption from federal income tax and lack of shareholder dividends. Historical data show that Chicago has foregone almost $7 billion in income since the last franchise renewal 30 years ago, which is more than twice the acquisition estimate of 1990 feasibility studies (in 2020 terms). These findings suggest establishing an MEU falls within the financial reach of the City and therefore deserves serious consideration due to the additional benefits it could provide.

Chicago has foregone almost $7 billion in income since the last franchise renewal 30 years ago.

There are multiple pathways for municipalization to occur in terms of MEU structure and operational agreements. The subtleties between them are beyond the scope of this document, which seeks to clarify the costs and benefits of municipalization that should be independent of the particular route chosen.

2. CONTEXT

Chicago's ongoing municipalization debate must be placed in the appropriate context. Several examples of municipalization exist across the nation, each with their own unique circumstances. As a result, direct comparisons are not immediately appropriate, though they can serve as useful reference points for further discussion. Additionally, it is worth considering the particular circumstances Chicagoans have faced, currently face, and will continue to face regarding electricity consumption.

2.1. LEGAL

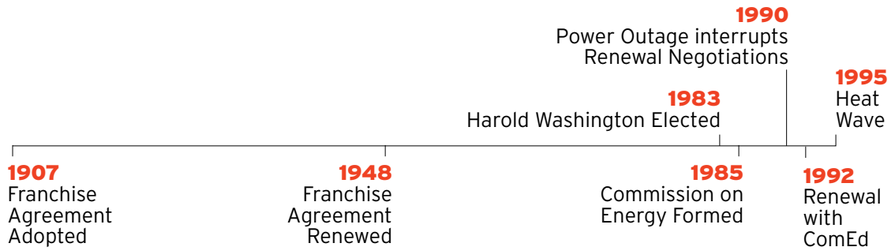
An undisputed legal route for municipalization exists at the state and local level. Both the Illinois Municipal Code [1] and the current franchise agreement [2] expressly permit the act of municipalization through multiple pathways. This redundancy places Chicago on solid legal footing to pursue municipalization in relation to similar efforts made elsewhere[3].

2.2. HISTORICAL

For more than a century, Commonwealth Edison (ComEd) has been the primary electric delivery service provider in the region. Its role, however, has been contentious since the beginning, with literature documenting the heavily political struggle that went into the 1990 franchise renewal debate[4]. In this section, the report engages with the historical context and significance of the municipalization debate in Chicago. It also links this debate to the current moment and reconciles concerns, both past and present.

The initial franchise agreement between ComEd and the region was adopted in 1907 with subsequent renewals in 1948 and 1990. The 1990 renewal was heavily debated[5], however, with racial and economic divisions of Chicago motivating the late 1980s movement for municipalization.

Mayor Harold Washington, elected in 1983, spearheaded the questioning of ComEd and the impact rising rates had on the local economy. In 1985, he formed the Commission on Energy to explore alternatives to ComEd, with one of these proposed alternatives being municipalization. In response to both the Committee's and an external consultancy's findings about an MEU's economic sustainability, ComEd began a focused lobbying campaign that pushed forth the narrative that the City lacked the competency to take charge of the utility and that municipalization would stifle local business. The late 1980s exploration came to an abrupt end with the sudden death of Mayor Washington. His successors Eugene Sawyer and Richard Daley's cautious approach to the issue stifled the momentum generated by the late Mayor Washington [6].



In 1990, franchise renewal negotiations between the City and ComEd were interrupted by a power outage affecting the west side of Chicago, an area where most residents were lower-income people of color. Instead of using this opportunity to build up the argument for municipalization, Mayor Daley extended the negotiation periods in light of upcoming elections. This public enquiry did not give opportunity to the spokespersons from the community to testify, citing a shortage of floor time [7].

In 1992, a renewal with ComEd was finally reached, with the private utility coming out stronger and with more favorable terms. Alternatives, such as leaseback and municipalization, were absent from public discourse. Three years after this agreement, the city was rocked by the 1995 heat wave that led to 739 deaths in the city. Scholar Eric Klinenberg, author of the book "Heat Wave: A Social Autopsy of Disaster in Chicago," argues that the map of heat wave deaths in Chicago was the map of poverty [8]. Most of the heat related deaths in this period were lower class elderly residents who had no working air conditioning or could not afford to use it. Chicago should consider its history of unequal access to electricity when facing current crises including COVID-related fallouts and climate change, both of which are discussed in the following sections.

2.3. PRESENT

This section focuses on the current dynamic between the investor-owned utility ComEd and Chicagoans, including the following:

1. ComEd's recent bribery scandal
2. a recent maintenance-related health and safety accident
3. COVID-19 electric shutoff decisions
4. rate increases and recent retractions

A recent health and These factors combined illustrate the tension resulting from repeated breaches in public trust and accountability.

2.3.1 Ongoing Bribery Scandal

ComEd officials allegedly arranged jobs, contracts, and payoffs to associates of "Public Official A," widely believed to be Illinois Speaker of the House Michael Madigan, in return for the lawmaker's support of laws that allowed ComEd to hike electricity rates. Separately, ComEd and Exelon Generation have spent more on lobbying than what other major organizations including the Illinois Chamber of Commerce, AT&T, the Illinois State Medical Society, Comcast, the Illinois Education Association, Caterpillar and State Farm, have spent combined [9].

The company concedes these lobbying expenditures and illicit bribery were to curry favor with governing bodies and protect its bottom line [9]. Over the eight-year period of the bribery scandal, ComEd collected upwards of 30-50% more in revenue for delivering power to customers as a result of the laws passed, with estimates ranging from $200 million up to nearly $1 billion depending on the laws/entities involved [10]. One of the laws that was passed, the 2011 Smart Grid bill, was initially vetoed by Governor Pat Quinn, who warned of profiteering. That veto was later overturned due to the efforts of ComEd's legislative allies who benefited from the bribes. Professor Ned Hill, an economist at Ohio State University who has given legal testimony on the relevant legislation, said ComEd's behavior as described in legal documents resembles "outtakes from The Godfather"[11].

Ongoing litigation against ComEd finds that the extent of ComEd's influence in state politics extends beyond even its known attempts to sway policy-making in the legislature. Romanucci & Blandin, LLC, a Chicago law firm engaged in litigation against ComEd, report in a press conference that they found a "special relationship" between ComEd and the Illinois Commerce Commission (ICC), the body charged with regulating and overseeing ComEd's services and safety procedures. This relationship, they believe, directly allowed the oversights which led to the death of Robert Zulauf[12], discussed in the next section.

"Corruption is not a victimless crime," a federal prosecutor against corruption implored Chicago and its residents to remember. "It affected our electrical bills, yours and mine." Aldermen have already called for ComEd to lower the rate hikes that were gained through corruption[9]. A recent report from the Illinois Public Interest Research Group details even further the benefits ComEd gained as a result of these bribes [13, 14, 15]. ComEd announced a rate decrease shortly thereafter: a reduction of $14 million for their ratepayer base [16], which amounts to less than 2% of their projected 2023 profits [13], or less than 3% of their reported 2019 cash dividend [17].

Corruption is not a victimless crime.

Beyond consumer bills, there are political and human costs associated with ComEd's corruption. More and more Americans report distrust in the political process, in the purpose and value of government, in democracy, and in each other [18]. Perceptions of corruption–or even worse, real corruption–are the most central driver of these trends [19]. A 2020 study from the University of Chicago using data from 2018 ranked Chicago as America's most corrupt city, and the recent revelations regarding ComEd's dealings will likely only further cement this statistic and reputation [20]. Beyond Chicago, Americans at large are justifiably concerned: research shows the views of everyday Americans are essentially inconsequential in what takes priority in national politics, due to the outsized sway of corporations and their lobbyists [21].

2.3.2 Health and Safety Issues

The political power exerted byComEd seems to extend beyond delivery rates. As a result of the cozy relationship between ComEd and the ICC identified by Romanucci & Blandin, LCC, the firm has found that "thousands" of reports on health and safety violations on ComEd infrastructure and electricity lines went unchecked and unfixed [12].

This resulted in a deadly outcome for one Chicago family in 2016. Robert Zulauf and his nephew, Jordan Zulauf, arrived to install Comcast cables on one of ComEd's electricity poles. Due to the improper installation of an insulator on the line, Robert was electrocuted and killed, and Jordan lost both of his arms.

ComEd withheld information on the accident, and reports had to be obtained via court order. The safety violation which led to the death of Robert Zulauf and the irreparable injury of 23-year old Jordan had been first reported some 48 years prior and, despite repeated reports, was never fixed. In a 2020 press conference, the Zulauf family and their legal representation reported that in the four years since the event ComEd had not taken appropriate action to fix the thousands of safety hazards and begin preemptively inspecting their infrastructure.

Furthermore, the firm's investigation found that ComEd hires only 30 inspectors to in- spect over 1.4 million poles. According to state law, each pole is to be inspected every two years. Meeting this regulation would leave each inspector a maximum average time of just over five minutes to travel to and inspect each pole in ComEd's territory, assuming each inspector continuously worked eight hours a day, 50 weeks a year, solely on pole inspections. ComEd's refusal to hire more inspectors demonstrates what Romanucci & Blandin call "knowledgeable indifference" on behalf of ComEd to the health and safety considerations of the community they serve. They additionally allow inspectors to examine poles without leaving their car—calling into question even those inspections that have taken place, perhaps like any inspections done on the pole that killed Robert Zulauf. The issue which led to his death was noticeable to any trained eye, the firm says.

"Why," then, the firm's lawyers ask, "did ComEd feel so comfortable evading safety rules when we have an entity, the ICC, which is supposed to be overlooking them?" [12]. Clearly, an overhaul on maintenance practice is needed for any future Chicago utility, municipal or investor-owned.

2.3.3 COVID Response and Fallout

When COVID-19 first hit Chicago, the City was able to announce a bill relief program for water and sewer services for the thousands of residents that lost their jobs. The same could not be done for electricity, which the City does not currently control. ComEd announced that it would not shut off electricity in homes amid the coronavirus and recession after pressure by Mayor Lightfoot, who had additional leverage at her disposal from the bribery scandal related to Speaker Madigan. Further, ComEd representatives warned that "costs from uncollected bills will be passed on to all customers in the forms of higher rates" [22]. Figure 2.1 shows ComEd's shutoff data for September 2020. The analysis in [23] indicates ComEd continued shutoffs in the last week of September, which is at odds with their alleged announcement that they would "not restart disconnections until after the winter months" on September 22, 2020 [22].

For low-income customers, the average amount of electric bills in arrears per household more than doubled in August 2020, to $549 compared to the amount the year before. When Illinois utilities agreed to provide monthly data on disconnections for each ZIP code, it unveiled where the damage was most intense. The neighborhoods that saw the highest per- centages of disconnections and warnings include Englewood, Chicago Heights, Ford Heights, Sauk Village, Lynwood, Woodlawn and Dolton [23]. All of these areas have high levels of poverty and are overwhelmingly Black. Up to 33% of debt held by families in these neigh- borhoods comes from utility bills. These ZIP codes have also been the primary targets of scams by alternative energy providers who promise lower bills only to raise rates later [24]. Energy payments, thus, are a considerable source of financial strain for Chicago's low-income residents.

Commonwealth Edison Total Households: 3.8 million	
Disconnected	9,553
Sent disconnections	176,402
Assessed late-payment fees	606,020
Under deferred-payment arrangements as of Sept. 1	79,220
Enrolling in new deferred-payment arrangements	40,781

Figure 2.1: ComEd shutoff data for September 2020, from Illinois Commerce Commission via [23].

The current relationship between Chicago and ComEd therefore appears quite tense, notwithstanding the present debate regarding municipal acquisition. This tension results from the aforementioned bribery scandal, which ComEd has explicitly and implicitly (through rate decreases) admitted to, inadequate maintenance which has caused health and safety issues, and a controversial response to pandemic-induced financial stress.

2.4 FUTURE

This section will lay out future climate risks for the Chicago area, how those climate risks in- teract with vulnerable populations through future health outcomes and worsened inequality, and ComEd's stated plans to address these risks and the implications for low-income fami- lies. Future electrical load growth and financial projections are dealt with in the subsequent section on Financial Cost Analysis.

2.4.1 Extreme Heat Risk

Though Illinois has taken strong action to address current climate risks, it has taken limited action to assess future vulnerabilities such as increased inland flooding, a greater number of heat wave days, drought, and destructive snow storms. According to Climate Central, a nonprofit that reports on climate science, projections show that in less than a decade from now Chicago will face nearly three total weeks every year where heat index exceeds 105 °F [25].

Recent research [26] shows that in Chicago, for every 20 °F increase in humidex (a similar metric to heat index, but applicable to a wider temperature range), ambulance dispatches increase by 64 calls per day. The author also states: "In the sub-analyses of the geographic regions of Chicago with the two largest populations, the Far North and West Sides, the effect of humidex on the number of calls per day was approximately 81% greater on the West Side than on the Far North Side . . . This is not accounted for by population size difference" [26]. This disparity is shown along with other regions of Chicago in Figure 2.2.

The previously mentioned disaster that was the 1995 heat wave demonstrates how de- structive heat waves can be for the Chicago community. Many of the 739 dead were elderly, poor and minority populations whose homes had inadequate cooling systems. Scholar Eric Klinenberg wrote "these were people whose lives could have been saved had they been given access to air conditioning and power earlier." Klinenberg alluded to the structural inequities that this extreme heat revealed: "In the poor, segregated neighbourhoods, especially on the South Side and the West Side, the suffering was overwhelming, and the death rate was enor- mous" [8]. Data from the last five years suggests the South and West Sides are still more at risk to extreme heat than other regions of Chicago, even more than two decades after the 1995 heat wave [26].

By 2050, Illinois is projected to see a ten-fold increase in the average number of dangerous health days a year, from five to nearly 50 days. Similarly for heat wave days, Illinois is projected to increase from 10 to more than 60 days a year by 2050. This effect will be amplified in urban areas such as Chicago: city summers are 2.2 °F hotter than those in rural areas [25]. Those aged over 65 or children under 5 are those most vulnerable to extreme heat. Within these vulnerable age groups, Chicago has 92,400 people living below the poverty line according to the US Census Bureau as of 2019 [27]. This increased heat will undoubtedly result in increased electricity demand, which is discussed in the following section on financial cost analysis.

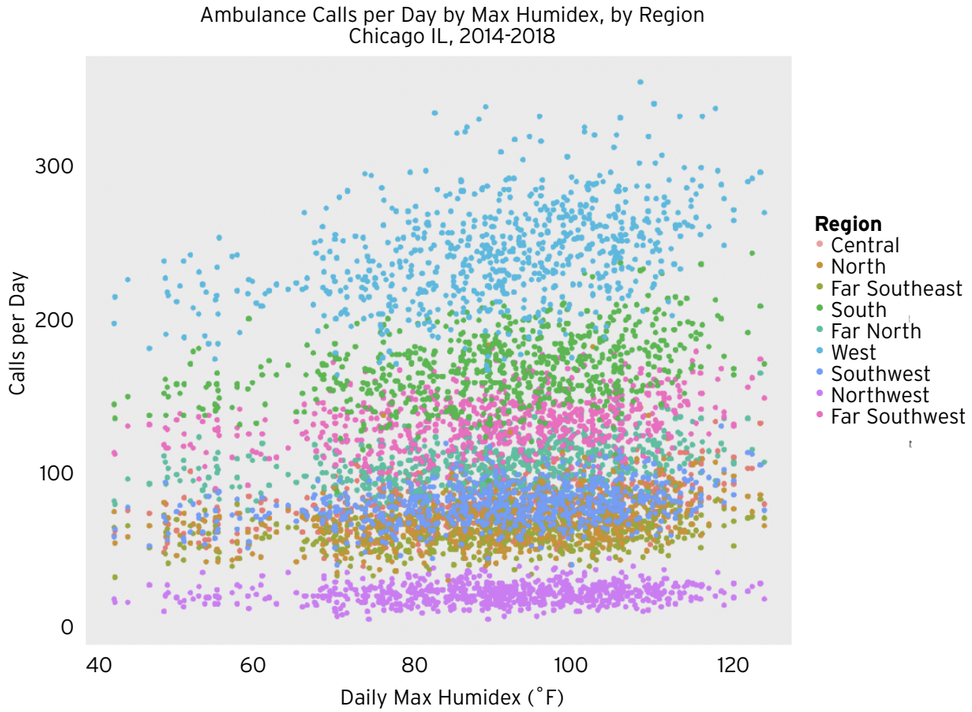


Figure 2.2: Regions in Chicago have unequal vulnerability to extreme heat [26].

All these factors—an abundance of evidence for increased extreme heat in the future, links between extreme heat and health, disparities between regions of Chicago, and a sizeable at risk population—make it clear that Chicago must implement a thorough plan to ensure all its residents are physically and financially able to keep their homes cool.

2.4.2 Renewables Targets

The state of Illinois has set a target of 25% renewable by 2025 [28], and Chicago intends to be 100% renewable by 2035 [29]. ComEd CEO Joseph Dominguez stated at a public hearing that the utility is not on track for either target, acknowledging the utility currently uses only 3% renewable energy sources, and "will 'probably' only reach 10% renewables by the 2025 deadline" [30, 31]. In comparison, Los Angeles' municipal energy utility achieved 25% renewables in 2017 [32], and Seattle already achieves 100% net-zero after carbon offsets [33]. In short: climate change puts Chicagoans more at risk to extreme heat, disparities in heat vulnerability have not been sufficiently addressed to date, and ComEd's current de- carbonization path is not aligned with Chicago's goals. A future utility should therefore properly address extreme heat risk for all neighborhoods and much more aggressively pursue decarbonization of its energy suppliers to meet the stated needs of Chicagoans.

3. FINANCIAL COST ANALYSIS

Two financial reports have been produced to estimate the price of electricity delivery under municipalization compared to by ComEd. The first report was prepared by Democratize ComEd, who conducted a feasibility study using public data to estimate the value of ComEd's Chicago assets, and the severance costs associated with transfer. The second report was prepared by NewGen Strategies and Solutions LLC, a utility management consulting firm engaged by the City of Chicago.

3.1 DEMOCRATIZE COMED FEASIBILITY STUDY

The Democratize ComEd feasibility report estimated the value of the ComEd utility assets to be between $4 and 6 billion, using data reported in the City of Chicago annual budget. Based on this estimate, and assuming a 5% interest rate, it estimates an annual repayment cost of between $275-350 million (dependent on the loan term). Assuming the revenue earned in Chicago for electricity distribution remains unchanged at $2.2 billion/year, with an overall profit margin of 18.3%, meaning the net earnings are $400 million/year. Overall, there- fore, the Democratize ComEd report expects revenue to exceed the cost of debt repayment (regardless of the length of the loan term), and that the investment is therefore sound. The suitability of the investment is compounded by: the presence of other earnings outside of electricity rates, the ability of the utility to retain the franchise fee, and the expected growth in the electricity market as decarbonization progresses towards the middle of the century.

3.2 NEWGEN FEASIBILITY STUDY

The NewGen report [34] had access to a greater volume of ComEd data, and therefore approached financial estimates in a different manner. In some respects, the results are similar, but a number of key differences cause the NewGen report to reach a different conclusion. The NewGen report had a similar estimate of the current value of the ComEd asset in Chicago, depending on the extent of asset depreciation which has occurred to date. New Gen estimates a value of $5 billion, comparable to the estimate by Democratize ComEd. However, NewGen, due to the more detailed information available, also estimated the value of severance costs (i.e. the cost of transferring assets from ComEd to a municipal utility) to be $3.8 billion, originating predominantly from purchasing transmission equipment and modifications to substations. Modifications, such as disconnections and reconstructions, were required both inside and outside the City of Chicago. NewGen's estimate of the severance costs was prepared by ComEd themselves, and NewGen highlights this severance cost to be a major uncertainty in the estimation. NewGen also estimates a start up cost of $809 million, which is likely to be a reasonable estimate. As a result, while the value of the asset is similar in both the Democratize ComEd and NewGen Reports, there are substantially higher upfront costs in the NewGen report, with a total estimated upfront cost between $7.5-11.5 billion. Using a 4.5% interest rate, NewGen equates this upfront cost to an annual cost of between $550-850 million. This includes a debt servicing cost of $122 million to maintain a debt service coverage ratio (DSCR) of 1.2. NewGen calculates the price of electricity distribution by estimating the annual operational costs of the Chicago grid and the annual electricity demand; it then uses the ratio of the total annual costs (equal to operational costs plus debt servicing) to the

demand to calculate a price per MWh. It compares the price per MWh calculated for the new municipal utility to the price presently charged by ComEd, concluding that the municipal utility delivery price would need to be 43% higher than the current price (in the first year) in order to break even.

3.3 REACH FINANCIAL ESTIMATE

The REACH financial estimate is adapted from the NewGen consultant's report, with a number of significant adjustments made.

In estimating the value of the Chicago utility assets, NewGen took the average of the asset value at time of construction ($5.7 billion) and the depreciated asset value ($3.9 billion) to reach a final estimate of $4.8 billion. The depreciated asset value was calculated using the average depreciation for ComEd's assets (31%) and applying it to the Chicago asset. Since the average age of plant inside and outside of Chicago is similar, the depreciated asset value ($3.9 billion) is a more reliable estimate of asset value. Because of the published data available from ComEd on this question, the City of Chicago would have strong grounds for negotiating a price comparable to the fully depreciated asset value. Indeed, NewGen has argued previously in an MEU feasibility study for Decorah, IA, that the "Original Cost Less Depreciation" is the appropriate value to pursue for acquisition [35]. NewGen's Chicago study did not provide reasoning why the case would be different locally.

Severance costs will be required to enable the two sets of assets to operate independently. The purpose of these severance costs is to enable the grid within Chicago's municipal boundary to operate independently from the grid external to Chicago. NewGen's report indicates that severance work is significant as connection to external electricity grids assists in the provision of an "efficient and redundant system to serve load", although since the load profiles around Chicago, in the adjoining suburbs, are in general similar to those within Chicago, they are unlikely to help with load distribution.

The costs estimated by NewGen for this severance are very large; they are comparable to the value of the asset itself. REACH does not consider it plausible that the cost of severing the two assets could be similar to the cost of all distribution equipment currently located within the Chicago grid. In particular, this grid already contains a large number of substations, electricity meters, as well as pole and wire infrastructure; it is not realistic that the addition of new metering and substations on only the municipal city border could be comparable in cost to the entire existing asset.

Additionally, REACH does not expect that the City of Chicago will need to pay for all severance costs which occur outside the City; to some extent these will fall to ComEd, which will need to balance new load under its own new regime. Negotiation over those costs will be possible. In addition, should it prove to be less costly, the City of Chicago has the right to purchase assets outside of its boundaries with approval from the Illinois Commerce Commission. This option can be leveraged to further lower severance costs, and eliminate the construction of needlessly redundant infrastructure.

If only a portion of the severance costs outside the City are included, then the actual severance will be between $2.4-3.9 billion, rather than the $3.9 billion used by NewGen. In our modelling, we very conservatively adopt the average value of $3.2 billion as a base case

estimate. The total acquisition value (assets plus severance) is then $7.1 billion, compared to the $8.8 billion total used in the NewGen study.

In estimating the annual capital costs, an interest rate of 4.0% is used. However, because of extremely low interest rates in the current economy, a lower interest rate is likely possible. Recent municipal bond activity suggests an interest rate of 3.5% is realistic in the current climate [36].

NewGen assumes that the municipal utility will need to maintain a DSCR of 1.2 in order to assure investors that loan repayments are possible. In their estimates, this amounts to a cost of $122 million/year, some of which is used to pay off annual capital expenditures related to plant renewal and replacement. NewGen assumes a 50-year asset lifetime for ComEd plant, and spreads this replacement cost out with capital expenditures of 1/50th this original undepreciated plant cost annually. This 1/50th of the original Chicago distribution plant cost of $5,747 million (2019 value) amounts to $115 million/year, which is less than the cash needed for debt servicing. It is unclear how NewGen estimated $165 million for this same metric, which leads to additional debt servicing in their model.

It is important to consider the possibility of longer bond terms such as 40 and 50 years, as well as the cost/savings of an MEU after all debts are paid regardless of term length, as significant savings are incurred from that point forward. A 50-year bond is assumed for REACH's analysis moving forward which matches the average lifetime of distribution plant.

3.3.1 Future Increased Electricity Demand

As energy systems decarbonize, they will increasingly turn to energy generated directly from solar and wind, rather than comparatively expensive hydrocarbon based fuels. This will drive electrification of the energy systems. In particular, the uptake of battery electric vehicles (BEVs) will replace gasoline and diesel, and electric heating (i.e. heat pumps) will reduce demand for natural gas networks. Because of these trends, electricity consumption from domestic grids will increase.

Two approaches are used here to estimate Chicago's future electricity demand: a 'top down' approach based on the US EIA's forecast, and a 'bottom up' approach, based on the electricity demand if all of Chicago's vehicles and heating were converted to electricity.

As energy systems decarbonize, they will increasingly turn to energy generated directly from solar and wind.

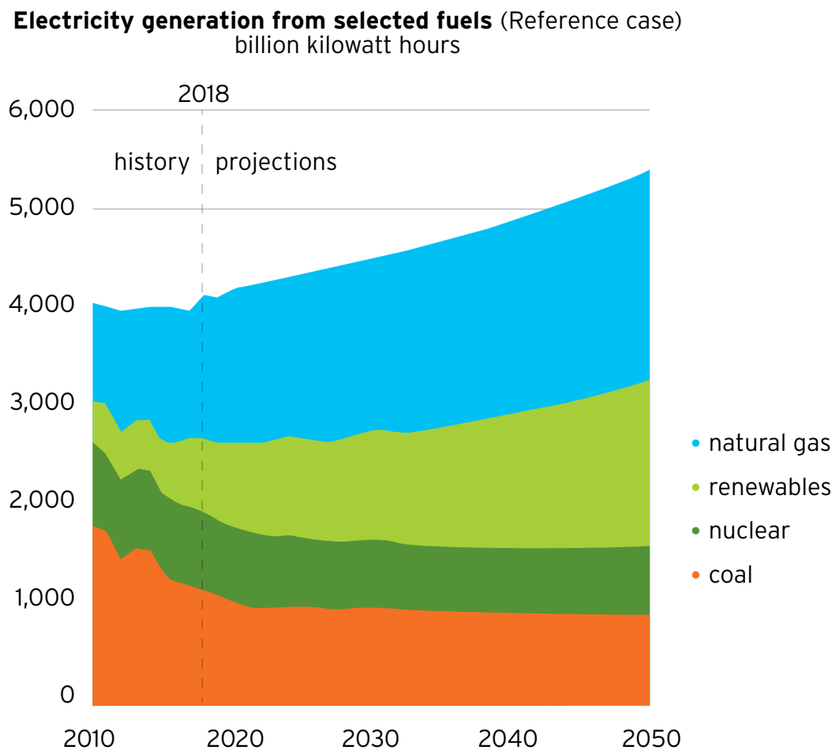


Figure 3.1: Load growth predictions including electricity sources from [37]

Top Down Approach The US Energy Information Administration (US Energy Information Administration 2020) forecasts that the increase in electricity demand will be approximately 25% by 2050 (or an annual load growth of 0.75%), as shown in Fig. 3.1. If Chicago is to take rapid steps to decarbonize its energy systems, then the increase within municipal boundaries may be even larger.

This increased electricity demand will increase profits for distribution networks, including a future Chicago municipal utility. A municipal utility could therefore pass savings onto consumers, whereas a privately owned utility is likely to keep costs fixed, passing revenues to shareholders as dividends.

Bottom Up Approach For Chicago specifically, electricity use will be driven by two areas: electrification of driving and electrification of heating. Increased summer cooling requirements will also increase demand, though that is not considered here.

Chicago contains 1.12 cars per household [38]; metropolitan Chicago had approximately 1.2 million households as of 2019 according to the U.S. Census Bureau [27]. The average Illinois driver (who is assumed to be representative of a Chicago driver) drives 8000 miles per year [39]. Due to the greater availability of public transit in Chicago compared to Illinois at large, this may be a liberal assumption. If this demand were to be entirely converted to an electric demand at a standard rate of 0.36 kWh/mile, then the increase in electricity demand would be 3.8 million MWh, which is equivalent to 16% of Chicago's current electricity consumption.

Chicago uses a very large amount of natural gas because of its cold climate, and the relative affordability of natural gas in the current market. According to the most recent data available, metropolitan Chicago uses approximately 2.8 billion therms of natural gas in residential and commercial use each year [40], which is equivalent to 82 million MWh. 57% of this gas is used residentially, where it is mostly used for space heating; the balance is used for and other appliances such as water heating, clothes drying and cooking. The vast majority of this energy is expected to be electrified as part of decarbonization. An average coefficient of performance for a heat pump driven by electricity is 3 (i.e. for one unit of electricity, 3 units of heat are provided), as heat pumps can use energy otherwise unavailable in the natural environment. Assuming 80% of Chicago's residential gas use were electrified, an increased demand of 12 million MWh would be expected, equivalent to almost 50% of Chicago's current electricity consumption. In reality, the true figure will be even larger as we trend towards complete electrification, including the industrial sector.

Overall, therefore, Chicago's electricity consumption could increase by as much as 65%; the US EIA's forecast therefore represents a conservative estimate that will be used for forward prediction here. It is worthwhile, however, to consider the very large profits that may accrue to a municipal electric utility in a high electrification scenario. Also, it is not clear whether the US EIA's forecast included load growth projected from increased cooling and air conditioning demand. As discussed previously, in less than a decade the city could face nearly three total weeks every year where heat index exceeds 105 °F [25], which would result in substantial electricity consumption.

3.3.2 Electricity Cost Forecast

A pro forma cash flow model for an MEU was developed similar to the one in NewGen's study, with minor changes to account for any load growth. Additionally, cash available after debt servicing was used to pay for annual renewals and replacements. A comparison of the inputs used in NewGen's and REACH's estimates are shown in Table 3.1.

	NewGen	REACH
Asset Acquisition ($M)	4,900	3,900
Severance ($M)	3,900	3,192
Startup ($M)	809	809
Annual Load Growth	0.0%	0.75%
Taxable Debt Rate	4.5%	4.0%
Bond Term (years)	30	50

Table 3.1: Comparison of estimates used in NewGen and REACH studies

Using NewGen's numbers in REACH's modified model yielded similar results to New- Gen's analysis, with no breakeven happening in the 30-year bond period. Simply looking at savings beyond the 30-year period, however, shows that over a 50-year period, MEU rates are on average 3.3% cheaper and the present value of total savings offered by an MEU is $1.2 billion. Once the debt is paid off large savings begin to accrue. NewGen's own estimates, therefore, show that an MEU will save Chicago and its ratepayers money. This further justifies the use of a longer-term bond to smooth out cash flow obligations. Results using NewGen's estimates are shown in Fig. 3.2.

When using REACH's values, significantly different results are obtained. Average MEU delivery rates over 50 years are 12% cheaper, and the present value of savings is $5.9 billion. MEU and ComEd rates break even in 2029 under a traditional debt repayment schedule, with MEU rates initially 11% higher in 2020 but falling to 39% lower in 50 years time. Also, DSCR in this scenario is always greater than 1.31, resulting from the revenue requirement needed for capital expenditures. A higher DSCR demonstrates less risk to the lender, which could result in more favorable terms. Results using REACH's estimates are shown in Fig. 3.3.

Since net savings are in fact achievable with an MEU, it is therefore possible to structure debt interest and principal payments in a way that rates could remain on their current trajectory. This debt structuring would avoid a sudden increase in rates in the first year. Achieving this while maintaining a minimum DSCR is known as debt sculpting, in which the MEU would have a reduced debt service obligation in earlier years. Net savings over time may be less compared to a traditional constant debt repayment schedule, but MEU rates would never exceed ComEd's projected rates at any point. This reduction in net savings additionally makes the debt offering more attractive to lenders, as more interest is paid. This analysis was not performed in the current study but is certainly worth further investigation. Readers are encouraged to view the pro forma estimates online, make a copy of the document for their own use, and explore the sensitivity of various inputs on the breakeven point and total savings.

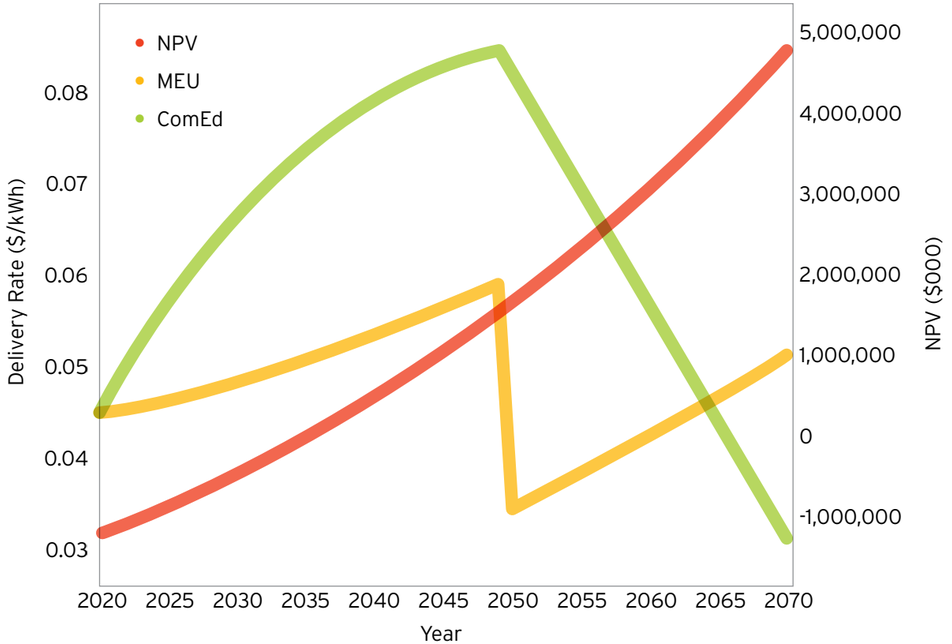


Figure 3.2: Using NewGen values, this compares MEU and ComEd rates over the next 50 years, along with the net present value (NPV) of the cost difference. A negative NPV means Chicago ratepayers save money. Note the rapid savings which occur after debt repayment.

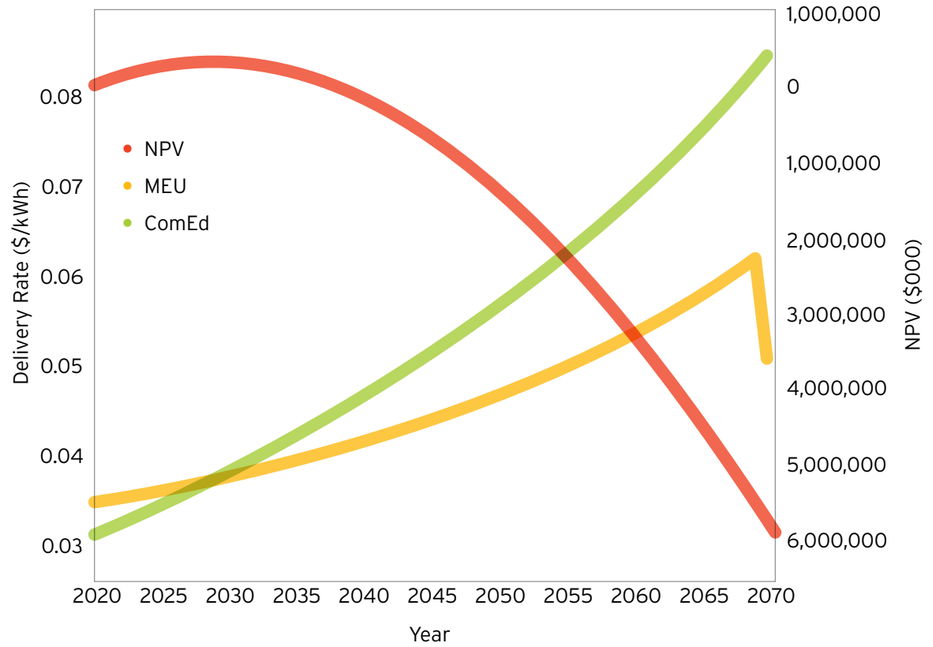


Figure 3.3: Using REACH values, this compares MEU and ComEd rates over the next 50 years, along with the net present value (NPV) of the cost difference. A negative NPV means Chicago ratepayers save money.

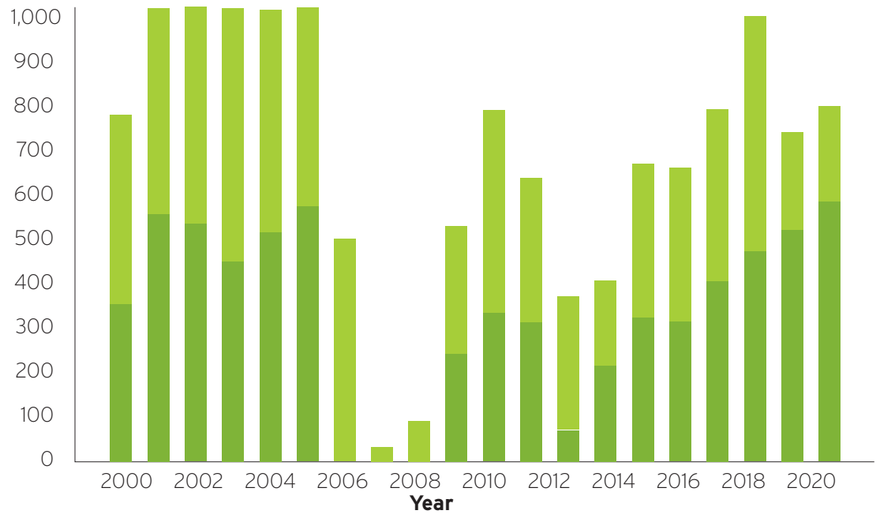


Figure 3.4: Annual cash dividends and combined federal and state income tax paid out by ComEd, which a municipal utility could have retained, from SEC filings [17]

3.3.3 Historical Dividend & Income Tax Analysis

This previous calculation used the total revenue requirement of a hypothetical utility as its basis for determining future rates and did not account for obligations to distribute profits to shareholders. A municipal utility would have no shareholders/parent companies to pay dividends towards. Additionally, municipal utilities are exempt from federal and state in- come tax. These cash flows are thus good approximations for the share of revenue ComEd collects which is not required for running a municipal utility; dividends and income tax leave ComEd's accounts annually and are by definition not reinvested into utility operations.

SEC filings from ComEd since 2000, shown below in Figure 3.4, show how much ComEd has paid out in cash dividends and combined federal and state income tax on an annual basis. With a 2% inflation rate, the combined value of these dividends and tax liabilities in 2020 is $14.4 billion. Filings for 1991-1999 were not readily available, and 2020 has not been filed yet. Scaling the 2020 present value for 2000-2019 of $14.4 billion to the entire length of the 30-year franchise agreement gives $21.7 billion. This assumes similar dividends and taxes were reported in the 1990's, accounting for inflation. Approximately 31% of ComEd's accounts are in Chicago [41, 42]. Applying this percentage to the estimated present value of ComEd's dividends and income tax liabilities gives a value of $6.7 billion.

This $6.7 billion in 2020 dollars represents lost income Chicago has not received since entering the current franchise agreement. A 1990 feasibility study estimated the cost of acquiring ComEd's non-generating facilities in Chicago at $1.8 billion in 1990 (ComEd at that time owned generation capacity) [43], or the equivalent of $3.0 billion in 2020 (2% inflation). ComEd paid out these cash dividends and federal/state income taxes on top of all operational costs and the mandated franchise fees. This demonstrates a sizeable income stream

originating from Chicago ratepayers flowing out of the city, which, according to estimates in 1990, is more than twice the acquisition cost for municipalization in 1990.

3.4 CONCLUSIONS ON FINANCIAL FEASIBILITY

Both NewGen and REACH estimates show that Chicago ratepayers save money with an MEU in the long-term, with REACH estimates projecting higher savings and a quicker break-even point. Prices between the utilities are expected to be equal by 2029 with a simple debt repayment schedule, rates cheaper on average by 12%, and total savings achievable over a 50-year period could amount to $5.9 billion. Debt sculpting could make it possible for MEU rates to never exceed those projected by ComEd. Historical analysis of dividends and income tax show that Chicago missed out on almost $7 billion of income since entering into the current franchise agreement, which is over twice the present value of municipal acquisition estimates made in 1990.

Both NewGen and REACH estimates show that Chicago ratepayers save money with an MEU in the long-term.

4. FURTHER OPPORTUNITIES

The preceding financial analyses demonstrated that municipalizing Chicago's electric utility is within reach. There are further opportunities summarized below which Chicago could pursue should it decide to municipalize, which arise from status as a public entity, and are not quantified in this study.

4.1. ELIGIBILITY FOR FINANCIAL/INSURANCE PRODUCTS

Weather risk transfer products could be used by the City of Chicago in order to obtain lower debt interest rates for municipalization. Chicago could insure against phenomena such as dangerous heat days and severe snow storms. There is a precedent of public counterparties using these products to stabilize budgets when considering future climate risk. For example, in Australia, WaterNSW, a government-owned statutory corporation that is responsible for supplying the state's water needs, bought protection against severe drought conditions to ensure its customers' needs are met.

Certain ESG-focused (Environmental, Social, Governance) sellers of these weather risk transfer products are willing to take slightly smaller returns on deals because of the environmental and societal return that projects such as municipalization would provide. These sellers are agnostic towards what the funds released by these weather triggers would go towards. Consequently, Chicago would have complete authority on whether these funds go towards providing low-income assistance, restoring power to affected communities by fixing power lines, and/or a combination of general resiliency measures.

4.2. RESILIENCE BONDS

A municipal utility would be eligible for resilience bonds. Resilience bonds work by quantifying climate risk in advance and buying protection structured on those risks. The capital raised for such a resilience bond is earmarked for projects that increase resilience to climate change: building underground transmission lines, implementing smart grids, energy efficiency measures, identifying at-risk infrastructure to future flooding, accelerating electrification, etc. Resilience bonds are designed so that the public entity becomes increasingly resilient as funded measures are implemented, causing insurance premiums to decrease. This mechanism would allow Chicago to complement their infrastructure plans with insurance and have decreasing costs for this insurance as projects continue. This class of bonds offer a way for governments to reduce their risk with investments that will reduce exposure and build resilience over the long-term. Notably, resilience bonds would fall strongly inline with the stated intentions of Chicago in the 2019 report "Resilient Chicago: A Plan for Inclusive Growth and a Connected City" which outlines the City's climate goals, among other targets [29].

Chicago could insure against phenomena such as dangerous heat days and severe snow storms.

4.3. EFFICIENT INTEGRATION WITH PUBLIC SERVICES

Chicago has an internationally recognized, proven track record with engineering-heavy public services, such as water, sewage, aviation, and transportation. The addition of an electric utility could increase public-sector synergy and lead to a greater economy of scale for the City, through overlapping operations such as bulk purchasing and negotiation power, shared fleet management, efficient land use, reduction of administration overhead, etc. With ownership of the poles, wires, and associated electric plant and rights-of-way, the City would be well- poised to develop a municipal broadband service to its residents, with most of the significant startup costs already incurred. Additionally, the City would have the discretion to stimulate local economic development through means such as lower delivery rates for small business.

Chicago has an internationally recognized, proven track record with engineering-heavy public services, such as water, sewage, aviation, and transportation.

5.CONCLUSION

This report examined existing municipal utility feasibility studies carried out for Chicago and contributed independent analysis to inform public debate and assist Chicago policymakers. The current debate on municipalization was framed in historical context and present tensions arising from the bribery scandal, maintenance issues, and pandemic fallout were discussed. Future risks to a Chicago utility in terms of extreme heat and neighborhood- varying vulnerability were explored, along with the gap between Chicago's stated renewable energy mix goals and ComEd's own.

The financial analyses of Democratize ComEd and NewGen were discussed and an addi- tional independent analysis was performed and compared to the prior. REACH estimated a total acquisition cost of $7.1 billion compared to NewGen's $8.8 billion. This difference stemmed from REACH's decision to use a depreciated asset value of $3.9 billion and a severance cost of $3.2 billion, rather than NewGen's $4.9 and 3.9 billion. REACH's asset estimation uses the depreciation reserve ratio of 31% calculated from ComEd's 2019 FERC Form 1, while NewGen halves that ratio. REACH's severance estimate considers that the City will not be liable for severance costs incurred outside its service territory, and that the City can purchase assets outside its service territory with ICC approval, eliminating redundant infrastructure construction.

This present analysis showed the breakeven point for a municipal utility with a simple debt repayment schedule could be as early as 2029, with an average rate reduction of 12% and could save $5.9 billion in present value over 50 years. Debt sculpting could ensure the MEU rates never exceed those projected by ComEd. Historical dividend and income tax liability for ComEd was quantified in 2020 terms and compared to past and present acquisition costs estimates. This showed that by not municipalizing in 1990, Chicago has foregone nearly $7 billion in potential income, which is over twice the estimate of asset acquisition in 1990 and more than present asset acquisition estimates. Furthermore, a public utility would be eligible for emerging classes of financial and insurance products which could be advantageous should the city decide to continue towards municipalization.

The decision to start an MEU must be viewed as an investment in the present and future residents of every neighborhood in Chicago, and not solely a financial decision. Returns on this investment additionally include harder-to-quantify aspects like improved accountability, local control, resilience, and aligned incentives that allow for the development of a utility more responsive to the needs of Chicago residents and better integrated with other public services. This would allow more effective pursuit of the stated goals of Chicago residents: more efficient use of clean, reliable, affordable energy, increased ability to serve low-income residents, and enhanced reinvestment in the community. These benefits are crucially relevant for Chicago in the face of increased severe weather and heat wave events, rising inequality, economic recovery post-COVID, and historical corruption/bribery.

In the depths of a global pandemic with severe economic ramifications and low costs of capital, making a significant investment in resilient public infrastructure seems especially worthwhile. Ultimately, this study strongly recommends pursuing municipalization after demonstrating financial feasibility and a range of desirable benefits including significant savings for Chicago ratepayers.

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A.APPENDIX

A. SEC FILING DATA

Year	Dividend ($M)	Income Tax ($M)	Combined Present Value (2020, 2% inflation, $M)
2000	326	332	978
2001	483	506	1441
2002	470	506	1394
2003	401	465	1213
2004	457	457	1255
2005	498	363	1159
2006	0	445	587
2007	0	80	103
2008	0	128	162
2009	240	229	583
2010	310	357	813
2011	300	250	657
2012	105	239	403
2013	220	152	427
2014	307	268	648
2015	299	280	639
2016	369	301	725
2017	422	417	890
2018	459	168	652
2019	508	163	684
		SUM	**14,400**

A2.CONDENSED PRO FORMA

Full versions with all years to 2070, formulas, and notes available at: https://docs.google. com/spreadsheets/d/1AbTIp6HzsFG9oW8LGjsoas3IsvguBtaX5jpPSMCbfVw/edit?usp=sharing

NewGen Values (ALL CURRENCY IN $000)		Forecast Years				
Item	**Value/Description**	**2020**	**2021**	**2050**	**2060**	**2070**
REVENUE/EXPENSE PROJECTION						
Asset Acquisition Cost	$4,900,000					
Severance Cost	$3,900,000					
Startup Cost	$809,000					
Annual Inflation	2.00%					
Annual Load Growth	0.00%					
Term (years)	30					
Debt Service Coverage Ratio (DSCR)	1.2					
Electrical Demand	kWh, growing w/ load growth	23,400,000	23,400,000	23,400,000	23,400,000	23,400,000
Operating Revenues	Calculation [1]	($1,033,320)	($1,040,233)	($808,806)	($ 985,929)	($1,201,843)
Projected Operating Expense	$/kWh, growing w/ inflation 0.00100 [2]					
Transmission Expense		($23,400) [3]	($ 23,868)	($ 42,386)	($ 51,668)	($ 62,983)
Distribution Expense	0.00550	($ 128,700)	($ 131,274)	($ 233,122)	($ 284,175)	($ 346,407)
Customer Expense	0.00274	($ 64,116)	($ 65,398)	($ 116,137)	($ 141,571)	($ 172,574)
General and Administrative Expense	0.00493	($ 115,362)	($ 117,669)	($ 208,962)	($ 254,724)	($ 310,507)
Total Operating Expenses		($ 331,578)	($ 338,210)	($600,608)	($ 732,137)	($ 892,471)
Non-Operating Expense						
Renewals and Replacements	Distribution Plant CapEx, growing with load and inflation [4]	($ 114,940) [5]	($ 117,239)	($ 208,198)	($ 253,792)	($ 309,371)
Less Prior Cash Reserve	[6]		($ 115,222)	($ 208,198)	($ 253,792)	($ 309,371)
Debt Service - Taxable	4.50%	($ 540,246)	($ 540,246)	($ -)	($ -)	($ -)
Debt Service - Non-taxable	3.60%	($ 44,539)	($ 44,539)	($ -)	($ -)	($ -)
Total Non-Operating Expense		($ 699,725)	($ 700,007)	($ 208,198)	($ 253,792)	($ 309,371)
						($ -)
Cash Available for Debt Service [7]	Input DSCR [8]	($ 116,957)	($ 117,239)	($ 208,198)	($ 253,792)	($ 309,371)
Deposited/(Withdrawn) from Cash Reserve	after paying debt service + renewals	($ 2,017)	($ (0)	($ 0)	($ -)	($ (0)
KEY PERFORMANCE INDICATORS						
Revenue Rate Requirement						
Chicago MEU	Equals Revenue	($1,033,320)	($1,040,233)	($808,806)	($ 985,929)	($1,201,843)
ComEd	Inflation + Load Growth	($ 732,915)	($ 747,573)	($1,327,574)	($1,618,305)	($1,972,705)
Difference		($ 300,405)	($ 292,660)	($ (518,769)	($ (632,376)	($(770,863)
% Difference		41.0%	39.1%	-39.1%	-39.1%	-39.1%
PV of Difference		$300,405	$286,921	-$286,397	-$286,397	-$286,397
Net Present Value ($000)	2020 basis, inflation	$300,405	$587,326	$4,482,759	$1,618,789	-$1,245,181
Average Rate ($/kWh)						
Chicago MEU	Calculation	($ 0.0442)	($ 0.0445)	($ 0.0346)	($ 0.0421)	($ 0.0514)
ComEd Rates	Avg Delivery Rate (ComEd)	($ 0.0313)	($ 0.0319)	($ 0.0567)	($ 0.0692)	($ 0.0843)
Increase/(Decrease) to ComEd Rates		($ 0.0128)	($ 0.0125)	($ (0.0222)	($ (0.0270)	($ (0.0329)
Effective Debt Service Coverage Ratio (DSCR)	Calculation	1.200	1.200	0.000	0.000	0.000

REACH Values (ALL CURRENCY IN $000)		Forecast Years				
Item	**Value/Description**	**2020**	**2021**	**2050**	**2060**	**2070**
REVENUE/EXPENSE PROJECTION						
Asset Acquisition Cost	$3,900,000					
Severance Cost	$3,192,000					
Startup Cost	$809,000					
Annual Inflation	2.00%					
Annual Load Growth	0.75%					
Term (years)	50					
Debt Service Coverage Ratio (DSCR)	1.2					
Electrical Demand	kWh, growing w/ load growth	23,400,000	23,575,500	29,279,759	31,551,358	33,999,192
Operating Revenues	Calculation [1]	($ 811,767)	($824,096)	($ 1,376,146)	($1,692,633)	($ 1,742,957)
Projected Operating Expense	$/kWh, growing w/ inflation					
Transmission Expense	0.00100 [2]	($ 23,400)	[3] ($ 24,047)	($ 53,036)	($ 69,667)	($ 91,512)
Distribution Expense	0.00550	($ 128,700)	($ 132,259)	($ 291,699)	($ 383,167)	($ 503,315)
Customer Expense	0.00274	($ 64,116)	($ 65,889)	($ 145,319)	($ 190,887)	($ 250,742)
General and Administrative Expense	0.00493	($ 115,362)	($ 118,552)	($ 261,469)	($ 343,457)	($ 451,153)
Total Operating Expenses		($ 331,578)	($ 340,746)	($ 751,523)	($ 987,176)	($ 1,296,722)
Non-Operating Expense						
Renewals and Replacements	Distribution Plant CapEx, growing with load and inflation [4]	($114,940)	[5] ($ 118,101)	($ 259,374)	($ 340,208)	($ 446,234)
Less Prior Cash Reserve	[6]		($ 118,101)	($ 259,374)	($ 340,208)	($ 446,234)
Debt Service - Taxable	4.00%	($ 330,134)	($ 330,134)	($ 330,134)	($ 330,134)	($ -)
Debt Service - Non-taxable	3.60%	($ 35,115)	($ 35,115)	($ 35,115)	($ 35,115)	($ -)
Total Non-Operating Expense		($ 480,189)	($483,350)	($ 624,623)	($ 705,457)	($ 446,234)
						($ -)
Cash Available for Debt Service [7]	Input DSCR [8]	($ 114,940)	($ 118,101)	($ 259,374)	($ 340,208)	($ 446,234)
Deposited/(Withdrawn) from Cash Reserve	after paying debt service + renewals	($ 0)	($ (0)	($ -)	($ 0)	($ 0)
KEY PERFORMANCE INDICATORS						
Revenue Rate Requirement						
Chicago MEU	Equals Revenue	($ 811,767)	($824,096)	($ 1,376,146)	($1,692,633)	($ 1,742,957)
ComEd	Inflation + Load Growth	($ 732,915)	($ 753,070)	($1,653,897)	($2,169,336)	($ 2,845,412)
Difference		($ 78,852)	($ 71,026)	($ (277,751)	($ (476,703)	($(1,102,455)
% Difference	-11.8%	10.8%	9.4%	-16.8%	-22.0%	-38.7%
PV of Difference		$78,852	$69,633	-$153,338	-$215,894	-$409,593
Net Present Value ($000)	2020 basis, inflation	$78,852	$148,485	-$1,359,131	-$3,240,932	-$5,857,749
Average Rate ($/kWh)						
Chicago MEU	Calculation	($ 0.0347)	($ 0.0350)	($ 0.0470)	($ 0.0536)	($ 0.0513)
ComEd Rates	Avg Delivery Rate (ComEd)	($ 0.0313)	($ 0.0319)	($ 0.0565)	($ 0.0688)	($ 0.0837)
Increase/(Decrease) to ComEd Rates		($ 0.0034)	($ 0.0030)	($ (0.0095)	($ (0.0151)	($ (0.0324)
Effective Debt Service Coverage Ratio (DSCR)	Calculation	1.315	1.323	1.710	1.931	0.000