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ComEd Beneficial Electrification Plan

July 2022

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I. Executive Summary

Legislative Background

On September 15, 2021, Illinois Governor J.B. Pritzker signed the Climate and Equitable Jobs Act ("CEJA"), an ambitious, multifaceted legislative act that sets a pathway for Illinois to make meaningful progress towards combating climate change.[1] Along with a commitment to preserve existing zero emissions electricity generating resources and develop new renewable resources, CEJA amended the Electric Vehicle Act, 20 ILCS 627/45 ("EVA") to include beneficial electrification ("BE") provisions that will help leverage Illinois's clean electricity grid to unlock even greater climate and air pollution benefits for Illinoisans. Per the EVA, all electric utilities serving more than 500,000 customers in Illinois are required to file a beneficial electrification plan for programs beginning by January 1, 2023.

BE refers to the substitution of direct fossil fuel consumption with electric power usage. For example, BE includes purchasing an electric vehicle powered by the wholesale electric grid instead of an automobile powered by a gasoline-fueled internal combustion engine. Rather than releasing pollutants (such as carbon dioxide, sulfur dioxide, nitrogen oxides, particulate matter, and others) through a tailpipe at surface level, often in areas of high population density, driving an electric vehicle substitutes gasoline usage for electricity generated with lower or no emissions. Though electrifying cars, vans, trucks, and buses is an attractive and common application of beneficial electrification, BE is not only limited to transportation measures. Electric heaters, cooktops, industrial boilers, and forklifts are some of the many promising BE applications.

29% of economy-wide carbon emissions in Illinois come from the electric sector, while the other 71% originate from the direct combustion of emitting energy sources in the transportation (33%) and residential, commercial, and industrial (38%, cumulative) sectors.[2] Nationwide carbon emissions are similar, with 32% originating from the electric sector, 37% from transportation, and 31% from the residential, commercial, and industrial sectors (cumulative).[3] Achieving deep decarbonization will require not only minimizing electric sector emissions, but also utilizing electricity created with low or no emissions as a clean alternative in other sectors of the economy. BE is a valuable and readily available tool for tackling the impact of carbon and surface-level pollution[4] from these other sectors to the benefit of all. Beyond delivering carbon and air quality benefits, BE also provides an opportunity for equitable investment and economic development that can benefit all Illinoisans.

[1] Public Act 102-662, enacted Sept. 15, 2021.
[2] U.S. Energy Information Administration, *Energy-Related CO_2 Emission Data Tables; Table 3: State energy-related carbon dioxide emissions by sector* (April 13, 2022), https://www.eia.gov/environment/emissions/state/.
[3] U.S. Energy Information Administration, *Monthly Energy Review*, at 203-210 (May 2022), https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf ("U.S. Energy Information Administration, May Monthly Energy Review").
[4] Surface-level pollutants include carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter, and volatile organic compounds.

Public Workshop Process

As prescribed by CEJA, the Illinois Commerce Commission ("ICC") hosted a series of workshops on beneficial electrification between November 2021 and February 2022. Across ten sessions, over fifty presenters shared their perspectives on a variety of topics central to BE adoption in Illinois. These presenters, along with the many stakeholders who provided valuable feedback and commentary during and after the workshops, produced a robust discussion of ideas, concerns, and priorities for utilities to consider when developing their beneficial electrification plans.

Several clear themes emerged from these workshops, which are reflected in ComEd's BE Plan. First, the workshops emphasized the importance of equity in pursuing BE adoption. Not only does an equity-focused BE plan ensure that all customers in the service area will benefit, it also provides an opportunity to improve air quality in communities that suffer disproportionately from pollution and where many residents do not drive the vehicles that contribute to air quality issues. Second, the widespread interest in the workshops and the variety of ideas proposed by stakeholders underscored ComEd's awareness that the BE landscape is an emerging, nascent ecosystem that should be kickstarted in a fashion that allows for a multi-pronged, "all of the above" deployment strategy across a wide range of electric vehicle types and BE applications. Third, a successful BE plan must be designed to overcome the many barriers that could limit or hamper BE adoption; Section IV of this BE Plan discusses many of these barriers, including upfront purchase or installation costs, insufficient education or awareness from potential adopters, inadequate consumer access to electric vehicle charging or supporting infrastructure, and rate structures that may inhibit public electric vehicle charging providers from expanding their network.

ComEd's BE Plan

In this plan, ComEd proposes to invest $100 million each year over the next three years to spur the adoption of beneficial electrification measures in its customer service area. While the majority of the Plan's funding is directed towards electric vehicles and electric vehicle infrastructure, it also includes funding for non-transportation BE measures and infrastructure. As described in further detail in Section V, ComEd's BE Plan is comprised of several components:

Table ES-1: Summary of ComEd BE Initiatives

PROGRAM NAME	ANNUAL FUNDING
Residential Program *Provides rebates for electric passenger vehicles, residential electric vehicle charging, and purchase or installation of residential electric appliances and equipment.*	$15M
C&I and Public Sector Program *Provides rebates for electric light-duty, medium-duty, and heavy-duty fleet vehicles, electric school buses, electric transit buses, electric vehicle charging stations, C&I non-transportation BE measures, and infrastructure for forklift or small business applications.*	$63M

PROGRAM NAME	ANNUAL FUNDING
Customer Education and Awareness Program *Expands the customer knowledge base of electric vehicles and BE through marketing, outreach, digital advising tools, and customer-specific fleet electrification assessments.*	$9M
BE Pilot Program *Explores the potential of BE through partnerships and pilots, such as air quality mapping, optimized charging, and grid services provided by electric school buses.*	$5M
Portfolio *Non-program specific, cross-cutting activities that support the overall BE Plan.*	$8M
Total:	**$100M**
ADDITIONAL BE ELEMENT	
New EV Charging Delivery Classes *Proposed concurrently, two new rate classes for C&I customers that provide electric vehicle charging are designed to address challenges faced by charging providers.*	N/A

ComEd's BE Plan is thoughtfully geared to achieve BE adoption and deliver benefits for low-income, Environmental Justice ("EJ"), and Restore, Reinvest, Renew ("R3") communities. For each electric vehicle rebate offered in the Residential Program and C&I and Public Sector Program, low-income applicants and applicants located in or serving EJ or R3 areas are eligible for a rebate sized 50% larger than the base level in recognition of the upfront purchase cost barrier low-income customers face and the magnified importance of delivering surface-level pollutant reductions in EJ and R3 communities. Further, ComEd has elected to target distributing over 40% of Residential Program and C&I and Public Sector Program funding to low-income, EJ or R3 applicants. ComEd has prioritized vehicle purchase rebates for fleet vehicles, especially medium-duty vehicles, heavy-duty vehicles, and buses due to their disproportionate share of carbon and surface-level pollutant emissions and their high annual mileages.

The EVA prescribes several requirements to ensure that ComEd's BE Plan is in the public interest and achieves the multifaceted goals of the law. These standards include addressing ten topics that are important in spurring BE adoption (such as cost barriers and educational efforts), eight public interest criteria (such as addressing environmental justice interests and achieving certain minimum investment targets), a rate impact cap for electric vehicle infrastructure investment, a demonstration of the Plan's cost-effectiveness, consideration of ICC Staff recommendations from the workshop process, and workforce equity initiatives. As Section VI describes in greater detail, ComEd's BE Plan meets or exceeds all of these requirements.

ComEd's BE Plan is poised to deliver tremendous benefits to northern Illinois. This three-year BE Plan is projected to reduce carbon dioxide emissions by nearly 900,000 million metric tons, avoid the

consumption of approximately 175 million gallons of gasoline or diesel fuel, and substantially reduce local levels of carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter, and volatile organic compounds. The total societal benefits of the ComEd BE Plan – which includes the public health benefits, avoided fuel costs, and reduced vehicle maintenance costs, among others – are expected to total $225 million from the measures adopted across the Plan's three years.

II. Electrification Overview

What is Beneficial Electrification?

Electrification is the strategy of using electricity to replace other forms of energy consumption including the direct use of fossil fuels. Beneficial electrification refers to applications where electrification produces overall benefits to society, including environmental benefits, cost savings or more efficient operation of the electric grid. This could involve replacing a gasoline-burning car with an electric vehicle, replacing at-home natural gas heating with an electric heat pump, using electric alternatives to industrial machinery, or any number of other applications.

By definition, BE leads to increased electric consumption. While this can lead to increased electric sector emissions, beneficial electrification is still a valuable tool in reducing net carbon emissions when emissions reductions in other sectors offset the increase in the electric sector. Since the electric sector only accounts for 29% of carbon dioxide ("CO_2") emissions in the state of Illinois and 32% in the U.S. (as seen in the following Figures II-1 and II-2), non-electric sector emissions (the remaining 71% statewide and 68% nationwide) must be reduced substantially to achieve ambitious long-term climate goals, such as the Paris Agreement's target of an 80% reduction in economy-wide CO_2 emissions by 2050.[5] Both the state of Illinois, through Governor Pritzker's Executive Order 2019-06,[6] and the Metropolitan Mayors Caucus, through their 2021 Climate Action Plan, have affirmed commitments to keep pace with or reach the targets in the Paris Agreement.[7]

Figure II-1: 2019 Illinois CO_2 emissions by sector[8]

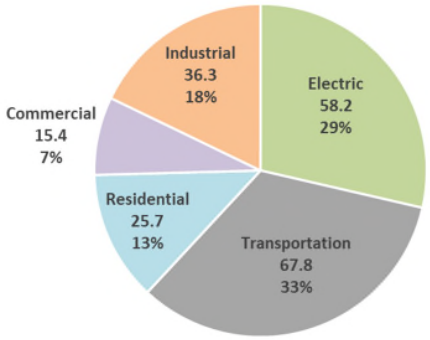
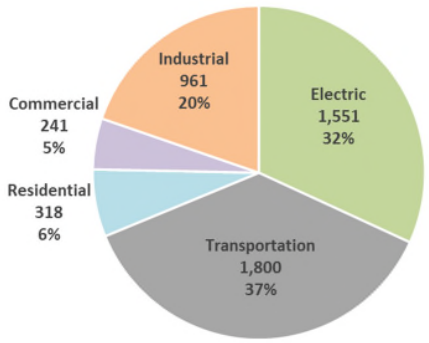


Figure II-2: 2021 U.S. CO_2 emissions by sector[9]



Figures are in million metric tons

[5] U.S. Energy Information Administration, *Energy-Related CO_2 Emission Data Tables; Table 3: State energy-related carbon dioxide emissions by sector* (April 13, 2022), https://www.eia.gov/environment/emissions/state/. *See also* U.S. Energy Information Administration, May *Monthly Energy Review* at 203-210.

[6] Illinois Executive Order 2019-06 (Jan. 23, 2019), https://www2.illinois.gov/IISNews/19626-Executive_Order_2019-06.pdf/.

[7] Edith Makra and Ned Gardiner, *Climate Action Plan for the Chicago Region*, Metropolitan Mayors Caucus, NOAA, and U.S. Climate Resilience Toolkit (2021), https://mayorscaucus.org/wp-content/uploads/2021/06/RegionalCAP_primary_and_appendices_062321-02.pdf.

[8] U.S. Energy Information Administration, *Energy-Related CO_2 Emission Data Tables; Table 3: State energy-related carbon dioxide emissions by sector* (April 13, 2022) https://www.eia.gov/environment/emissions/state/.

[9] U.S. Energy Information Administration, *May Monthly Energy Review* at 203-210.

BE is an important complement to efforts to decarbonize the electric grid because it leverages the cleaner grid to its greatest potential. Many sectors of the economy do not have as many commercially feasible, readily available, low-carbon alternatives as the electric sector. Pursuing an electric alternative may be the best, and perhaps only, pathway to lowering carbon emissions in some industries. As the electric sector emissions intensity decreases, and as incremental reductions to the grid emission intensity become more challenging or costly to achieve, BE provides an option to make further headway towards economy-wide carbon reduction goals.

Importantly, beneficial electrification and electric sector decarbonization efforts reinforce and enhance each other. Adding more electric demand, especially if the demand is variable or controllable (as is the case with some electric vehicle charging), can help integrate more intermittent renewables onto the grid by reducing curtailments and smoothing periods of price volatility. In turn, as the emissions intensity of the electric grid goes down, there are greater benefits (environmental and otherwise) to replacing non-electric consumption with relatively cleaner electric sector consumption. The state of Illinois has wisely determined that BE efforts should proceed in parallel with efforts to retain and add zero-emissions resources on the grid.

Industry experts and climate scientists agree on the importance of beneficial electrification in meeting ambitious climate goals. Recent National Renewable Energy Laboratory ("NREL") and Electric Power Research Institute ("EPRI") studies found that cross-sector electrification applications could reduce economy-wide CO_2 emissions by 17% and 19%, respectively, in conservative scenarios and by as much as 47% and 67%, respectively, under more transformative scenarios.[10] In two other studies that analyzed the optimal pathway to an 80% economy-wide reduction of carbon dioxide emissions by 2050, beneficial electrification was widely used, accounting for 16% and 23% of the required greenhouse gas reductions, respectively.[11]

The remainder of this section provides an overview of Illinois's starting point on the electrification effort, including a description of various beneficial electrification options and the progress made to date in ComEd's customer service area.

Transportation Beneficial Electrification

As shown previously in Figures II-1 and II-2, the transportation sector accounts for 33% of Illinois and 37% of U.S. carbon emissions, and nearly all these emissions are the result of direct combustion of petroleum products. As a result, transportation is a natural focus for electrification efforts.

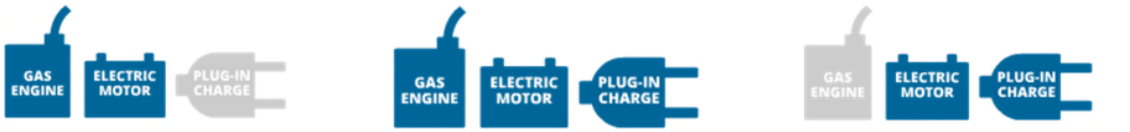
[10] Caitlin Murphy et al., *Electrification Futures Study: Scenarios of Power System Evolution and Infrastructure Development for the United States*, NREL, at 61 (2021), https://www.nrel.gov/docs/fy21osti/72330.pdf. *See also* EPRI, *U.S. National Electrification Assessment*, at 8 (2018), https://ipu.msu.edu/wp-content/uploads/2018/04/EPRI-Electrification-Report-2018.pdf.

[11] JH Williams et al., *The technology path to deep greenhouse gas emissions cuts by 2050: The pivotal role of electricity*, *Science*, at 335:53–59 (2012); NRDC, *America's Clean Energy Frontier: The Pathway to a Safer Climate Future* (September 2017), https://www.nrdc.org/sites/default/files/americas-clean-energy-frontier-report.pdf.

Electric Vehicles

There are three categories of vehicles often referred to as electric vehicles: hybrid electric vehicles ("HEVs"), which have a traditional gasoline-powered internal combustion engine and an electric motor that is unable to charge through plug in charging; plug-in hybrid electric vehicles ("PHEVs"), which have a gas-powered internal combustion engine and an electric motor that can be charged from the electric grid; and battery electric vehicles ("BEVs"), which operate exclusively using an electric motor that is charged by the electric grid and typically have a much larger battery system than a PHEV.

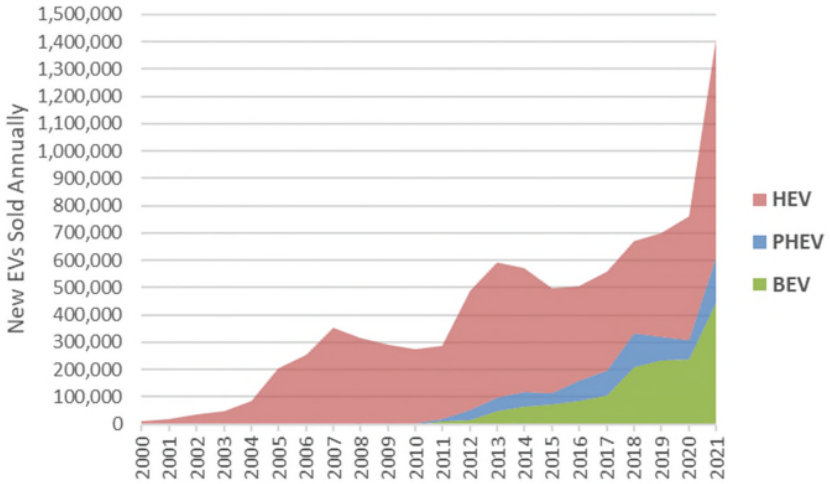
Figure II-3: Types of Electric Vehicles[12]



Hybrid Vehicle (HEV) **Plug-in Hybrid Vehicle (PHEV)** **Battery Electric Vehicle (BEV)**

In the past twenty years, the market for electric vehicles in the United States has grown by leaps and bounds, first through the adoption of hybrid vehicles and PHEVs, and more recently through the fourfold increase in BEV sales in the last four years. As Figure II-4 shows, over 443,000 BEVs and 1,400,000 total electric vehicles (including hybrids) were sold in 2021, representing 3% and 9%, respectively, of new sales of light-duty vehicles (i.e., passenger vehicles such as sedans, SUVs, and pickup trucks).

Figure II-4: U.S. Electric Vehicle Sales, 2000-2021[13]



[12] ComEd, *Savings, Benefits & Incentives*, https://www.comed.com/SmartEnergy/InnovationTechnology/Pages/SavingsBenefitsIncentives.aspx (last visited June 27, 2022).

[13] U.S. Department of Energy, *Fact of the Week #1227* (Feb. 28, 2022), https://www.energy.gov/eere/vehicles/articles/fotw-1227-february-28-2022-light-duty-plug-electric-vehicle-sales-united; U.S. Department of Energy, *Fact of the Week #1222* (Jan. 24, 2022), https://www.energy.gov/eere/vehicles/articles/fotw-1222-january-24-2022-light-duty-vehicle-sales-2021-were-3-higher-2020; Oak Ridge National Laboratory, *Transportation Energy Data Book: Edition 40* at Table 6.2, (June 2022), https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf#page=201.

Because HEVs and PHEVs use some gasoline while BEVs use none, the benefits of HEV and PHEV adoption are less than the benefits of BEV adoption. The Electric Vehicle Act, as amended by CEJA, defines an Electric Vehicle as "a vehicle that is **exclusively** powered by and refueled by electricity, must be plugged in to charge, and is licensed to drive on public roadways."[14] This definition includes BEVs and excludes PHEVs, therefore the term, "EV," will refer exclusively to BEVs from this point forward.

As the market evolves, the number of available electric vehicle models, the types of electric models, and the number of manufacturers producing electric vehicles continues to grow. As of May 2022, there are 32 commercially available EV models in the U.S., of which 29 EVs are sold in Illinois. By the beginning of 2024, 27 additional announced EV models are projected to be commercially available.[15] These vehicles are not purely offered by luxury brands: Kia, Ford, Hyundai, Chevy, and Nissan all offer electric vehicle models, and Toyota and Subaru will debut all-electric models in their 2023 fleet. As Table II-5 shows, most vehicles on the road in the U.S. are "light-duty" vehicles such as typical passenger cars. While there are fewer medium- and heavy-duty vehicles on the road, these vehicles typically have much larger carbon footprints since they are less fuel efficient and driven greater distances.

Table II-5: U.S. Highway Vehicles by Type, 2020

Vehicle Type	Share of Vehicles on Road[16]	Share of U.S. On-Road Vehicle CO_2 Emissions[17]
Light-Duty, Small (e.g., compact, sedan, small SUVs)	70.3%	67.8%
Light-Duty, Large (e.g., large SUVs, vans, pickups)	21.5%	
Medium-Duty (e.g., delivery trucks, bucket trucks)	3.8%	30.7%
Heavy-Duty (e.g., refuse trucks, semi tractors)	1.1%	
Bus	0.4%	1.3%
Motorcycle	3.0%	0.2%

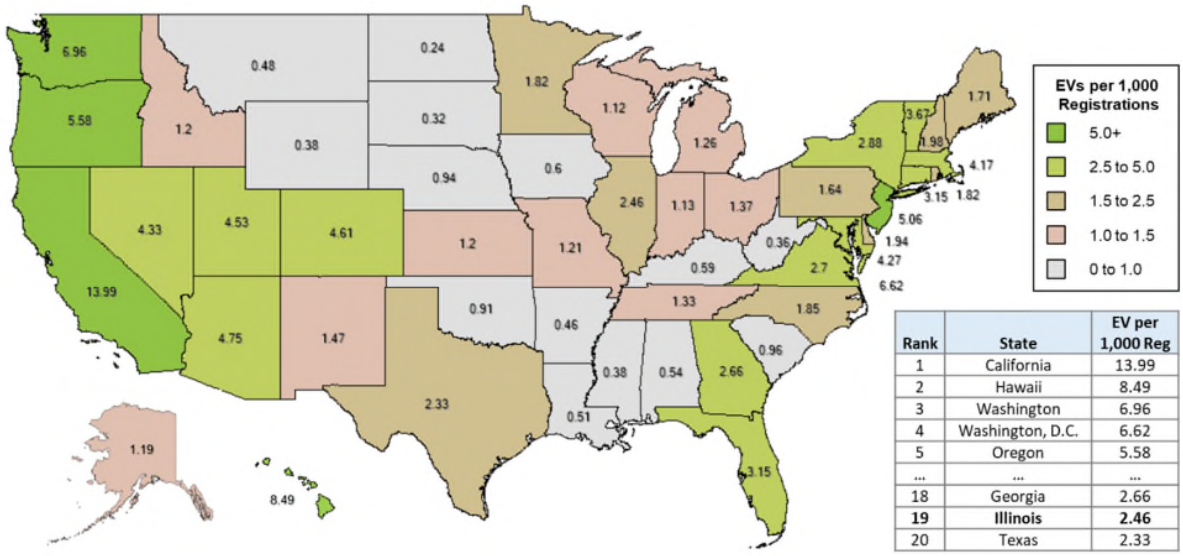
ComEd/Illinois EV Adoption

While electric vehicle adoption is on the rise nationwide, some states have experienced greater EV growth than others. Illinois, with its one million EV goal, aspires to become a leader in transportation

[14] 20 ILCS 627/45(a).
[15] Atlas, *EV Hub*, https://www.atlasevhub.com/login/?redirect_to=https%3A%2F%2Fwww.atlasevhub.com%2Fmaterials%2Fautomakers-dashboard%2F (last visited June 27, 2022).
[16] Bureau of Transportation Statistics, *Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances*, https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances (last visited June 27, 2022).
[17] U.S. Environmental Protection Agency, *Fast Facts; U.S. Transportation Sector Greenhouse Gas Emissions 1990-2020* (May 2022), https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions.

electrification. Currently, however, it is in the middle of the pack. As of May 2022, there are 43,481 electric vehicles registered in Illinois.[18] Illinois ranks 19th among states in its share of electric vehicles among registered motor vehicles. If the counties in which ComEd provides service were their own state, it would rank 16th.

Figure II-6: U.S. Electric Vehicle Adoption (per 1,000 Motor Vehicle Registrations)[19]



Rank	State	EV per 1,000 Reg
1	California	13.99
2	Hawaii	8.49
3	Washington	6.96
4	Washington, D.C.	6.62
5	Oregon	5.58
...	...	...
18	Georgia	2.66
19	**Illinois**	**2.46**
20	Texas	2.33

Policymakers have articulated a clear goal in the Electric Vehicle Act: "Illinois should increase the adoption of electric vehicles in the State to 1,000,000 by 2030"[20] and "Illinois should strive to be the best state in the nation in which to drive and manufacture electric vehicles."[21] As the Act notes, this will entail not only initiatives to put EVs on the road but also expanded infrastructure investment.

[18] Office of the Illinois Secretary of State, *Electric Vehicle Counts by County*, https://www.ilsos.gov/departments/vehicles/statistics/electric/home.html.

[19] U.S. Department of Energy Alternative Fuels Data Center, *Electric Vehicle Registrations by State* (December 31, 2020) https://afdc.energy.gov/data/10962. *See also* U.S. Department of Transportation Federal Highway Administration, *State Motor-Vehicle Registrations – 2020* (June 2022), https://www.fhwa.dot.gov/policyinformation/statistics/2020/mv1.cfm.
These data sources, representing data as of the end of 2020, are the most recently available state-level data summarizing EV registrations and motor vehicle registrations. Since the end of 2020, electric vehicle adoption in Illinois has kept pace with, but not exceeded, national average adoption rates. New EV registrations in Illinois, published by the Office of the Secretary of State increased by 44% from the end of 2020 to the end of 2021, the same rate at which national EV registrations grew in 2021. *Compare* Office of the Illinois Secretary of State, *Electric Vehicle Counts by County*, https://www.ilsos.gov/departments/vehicles/statistics/electric/home.html; U.S. Department of Energy, *Fact of the Week #1227* (Feb. 28, 2022), https://www.energy.gov/eere/vehicles/articles/fotw-1227-february-28-2022-light-duty-plug-electric-vehicle-sales-united.

[20] 20 ILCS 627/45(a)(1).

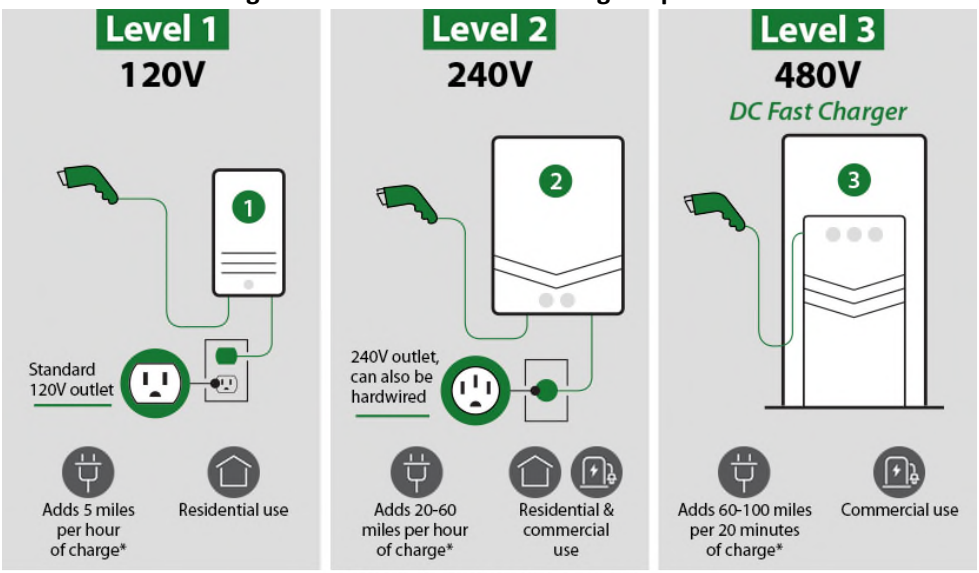
[21] 20 ILCS 627/45(a)(2).

Charging Infrastructure

Supporting transportation electrification involves not only deploying new electric vehicles, but also ensuring that EV owners have access to adequate options to charge their vehicles. Just as internal combustion engine ("ICE") drivers rely on ubiquitous access to gas stations to refuel their cars, EV drivers need to be confident that they can recharge their vehicles battery relatively easily. Unlike ICE drivers, many – but not all – EV drivers have the option to charge their vehicles at home. For other occasions when charging is needed, EV drivers rely on private or public networks of EV chargers. Largely, the public EV charging market has been developed by independent business enterprises, each of which may offer a different pricing structure and usage rules.

Several broad categories of EV chargers are available that vary based on charging time, voltage and installed cost. Level 1 ("L1") charging refers to charging through a standard 120-volt outlet, Level 2 ("L2") charging uses a higher voltage and specialized equipment to provide faster charging, and Level 3 ("L3") – typically referred to as Direct Current Fast Charging ("DCFC") – can provide nearly a full recharge within an hour of charging. The following figure compares the three alternatives.

Figure II-7: Electric Vehicle Charger Options[22]



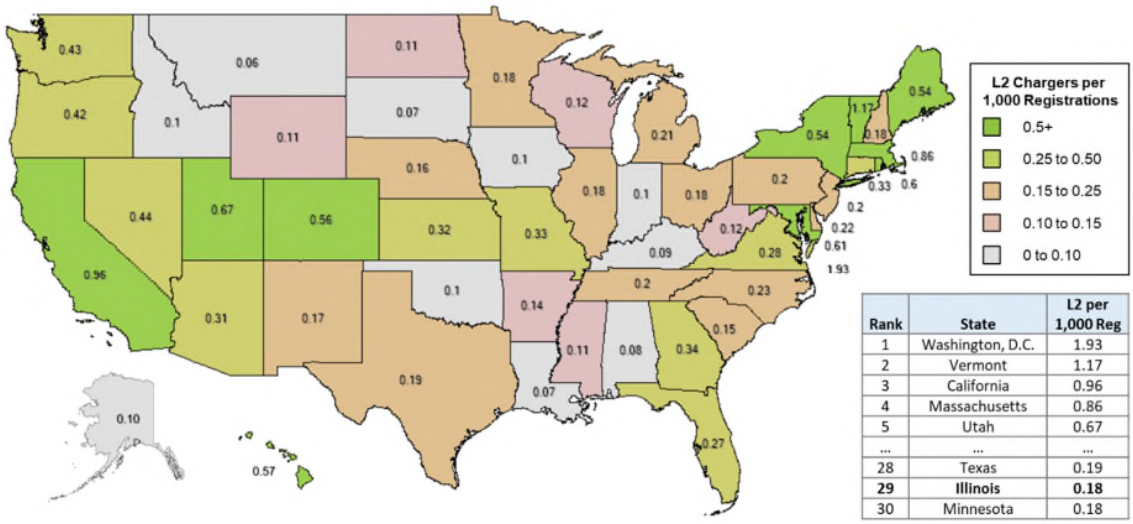
** Estimated. Actual charge times may vary.*

Due to its slow rate of charging, L1 is typically only used in residential applications for overnight charging of vehicles with limited or moderate daily driving distances; public charging options are either L2 or DCFC. In time, even faster charging options may become available.

Like with EV adoption rates, the number of public EV chargers in Illinois lags behind the leading states. Illinois ranks 29th among states in public L2 chargers per motor vehicle, as well as 29th in public DCFC plugs. If the counties in which ComEd provides service were its own state, it would rank 24th and 27th, respectively, in public L2 and DCFC charging.

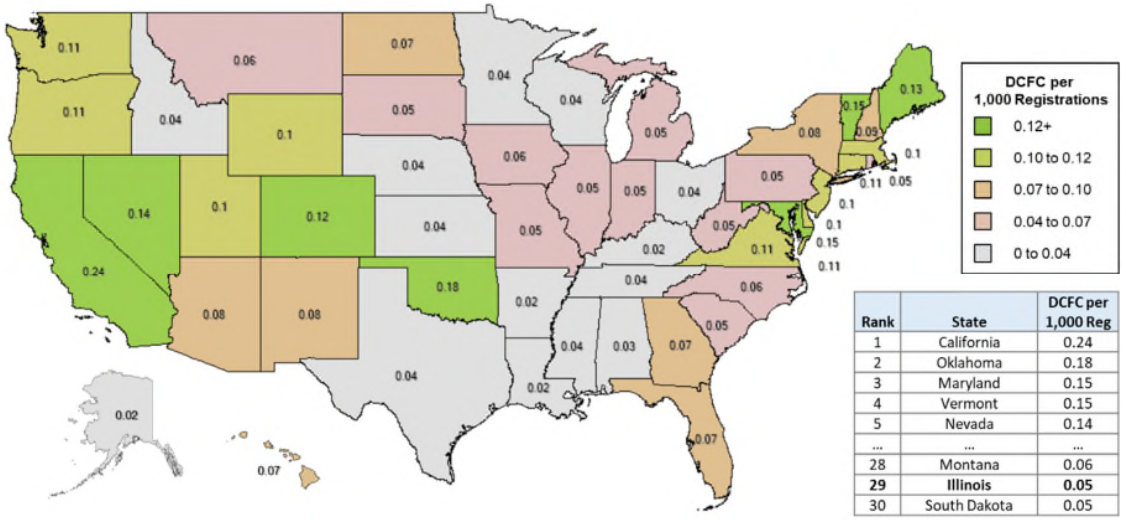
[22] Central Hudson, *How to Charge*, https://www.cenhud.com/my-energy/electric-vehicles/how-to-charge/ (last visited June 27, 2022).

Figure II-8: U.S. L2 Chargers per 1,000 Vehicle Registrations[23]



Rank	State	L2 per 1,000 Reg
1	Washington, D.C.	1.93
2	Vermont	1.17
3	California	0.96
4	Massachusetts	0.86
5	Utah	0.67
...	...	...
28	Texas	0.19
29	**Illinois**	**0.18**
30	Minnesota	0.18

Figure II-9: U.S. DCFC Chargers per 1,000 Vehicle Registrations[24]



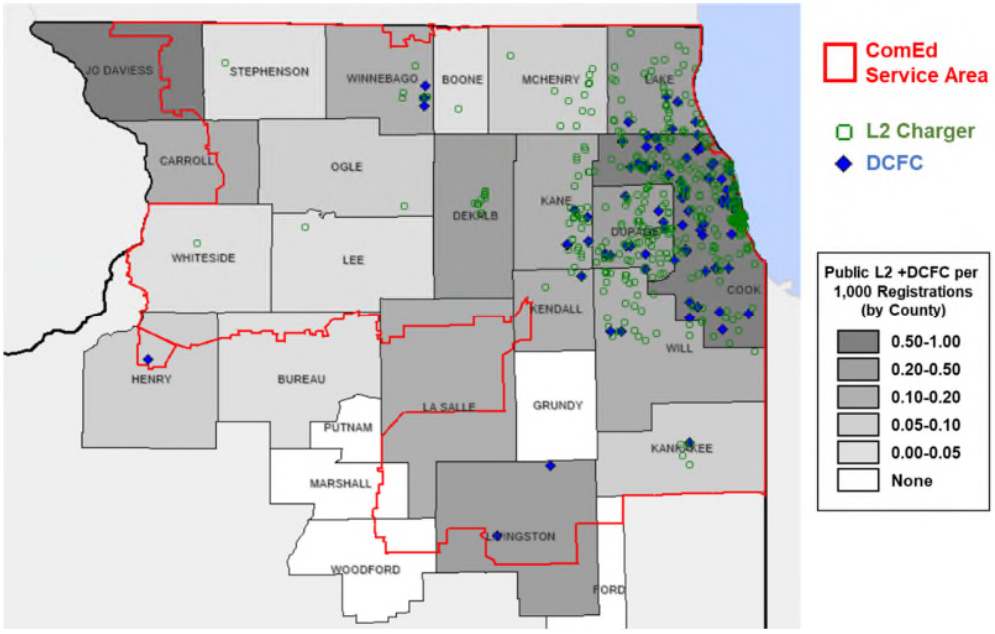
Rank	State	DCFC per 1,000 Reg
1	California	0.24
2	Oklahoma	0.18
3	Maryland	0.15
4	Vermont	0.15
5	Nevada	0.14
...	...	...
28	Montana	0.06
29	**Illinois**	**0.05**
30	South Dakota	0.05

[23] U.S. Department of Energy Alternative Fuels Data Center, *Alternative Fueling Station Counts by State* (as of June 2, 2022), https://afdc.energy.gov/stations/states. U.S. Department of Transportation Federal Highway Administration, *State Motor-Vehicle Registrations – 2020*, (June 2022) https://www.fhwa.dot.gov/policyinformation/statistics/2020/mv1.cfm.

[24] U.S. Department of Energy Alternative Fuels Data Center, *Alternative Fueling Station Counts by State* (as of June 2, 2022), https://afdc.energy.gov/stations/states. U.S. Department of Transportation Federal Highway Administration, *State Motor-Vehicle Registrations – 2020*, (June 2022) https://www.fhwa.dot.gov/policyinformation/statistics/2020/mv1.cfm.

Further, as Figure II-10 shows, public chargers in ComEd's service area are primarily clustered around metro Chicago, providing limited public charging options outside of that region.

Figure II-10: Public Chargers in ComEd Service Area[25]



While estimates of the number of public chargers needed to fully support EV adoption varies based on numerous assumptions, around 7,500 L2 and 5,000 public DCFC (150kW) chargers will be needed in Illinois (and approximately 4,650 L2 and 2,250 public DCFCs in ComEd's customer service area) in order to support the public charging needs of one million EVs in Illinois, based on models from NREL.[26]

The Infrastructure Investment and Jobs Act, signed into law in November 2021, will help expand public EV infrastructure across the country. The law provides a combination of formula-based allocations to states and territories, competitive grant applications for municipalities and public organizations, and enhanced financing mechanisms. The Illinois Department of Transportation has estimated that "Illinois would expect to receive $149 million over the next five years to expand the EV charging network."[27]

Non-Transportation Beneficial Electrification

Though transportation electrification opportunities may come most easily to mind, there are a multitude of opportunities to achieve cross-sector net emission reductions through other electrification measures. These include, but are not limited to:

[25] U.S. Department of Energy, *Alternative Fueling Station Locator*, https://afdc.energy.gov/fuels/electricity_locations.html (last visited June 27, 2022).
[26] NREL, *Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite*, https://afdc.energy.gov/evi-pro-lite.
[27] Illinois Department of Transportation, *Infrastructure and Jobs Act Fact Sheet*, https://idot.illinois.gov/Assets/uploads/files/Transportation-System/Fact-Sheets/Rebuild-Illinois/IIJA-fact-sheet.pdf.

- Heating/Cooling: Electric heating and cooling options replace direct combustion of fossil fuel with electricity. This includes the deployment of electric-powered heat pumps. Unlike most common heating systems, a heat pump transfers heat between the outside and inside of a building rather than using fossil fuel combustion. Running on electricity, emissions from an air source heat pump are limited to those created in the generation of electricity to power the system.

- Residential/Commercial appliances and equipment: Appliances used by residential customers or commercial enterprises may have electric alternatives, such as lawn care, cooking equipment, or snow removal devices. These alternatives can substantially reduce noise levels, reduce maintenance or repair costs, use less energy, and improve indoor and outdoor air quality. Gasoline powered lawn mowers, for example, may inefficiently combust fuels due to their small size, producing a disproportionately high amount of air pollution per gallon of fuel, which means that electrifying these devices can be an especially effective emission reduction strategy when considered on a per-MWh basis.

- Industrial applications: Converting diesel-powered machinery (such as cranes or forklifts) to comparable electric devices. For example, forklifts often work in confined spaces with limited air circulation. Switching to an electric forklift can improve warehouse air quality, lower ventilation costs, reduce noise levels, and reduce the risk of workplace accidents caused by storage and handling of volatile fuels.

- Port applications: Allowing docked ships to connect to the grid while in port would avoid the need to use on-board diesel generators to generate electricity for internal use. Besides tapping into more efficient generators on the grid, electrifying shore power usage can substantially improve air quality by decreasing port-side emissions from diesel generation such as particulate matter, sulfur dioxide, nitrous oxides, and volatile organic compounds.[28]

[28] EPA Office of Transportation and Air Quality, *Shore Power Technology Assessment at U.S. Ports* (March 2017) https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100RDAG.pdf.

III. Benefits of a Successful Beneficial Electrification Program

Beneficial electrification programs are a win-win for participants and non-participants alike on multiple fronts. BE programs improve climate and health for all, leveraging Northern Illinois' clean energy advantage. They can lower fuel and maintenance costs while providing grid benefits. They can provide environmental justice and equity for communities that disproportionately suffer the impacts of poor air quality. BE programs can also spur economic development in Illinois.

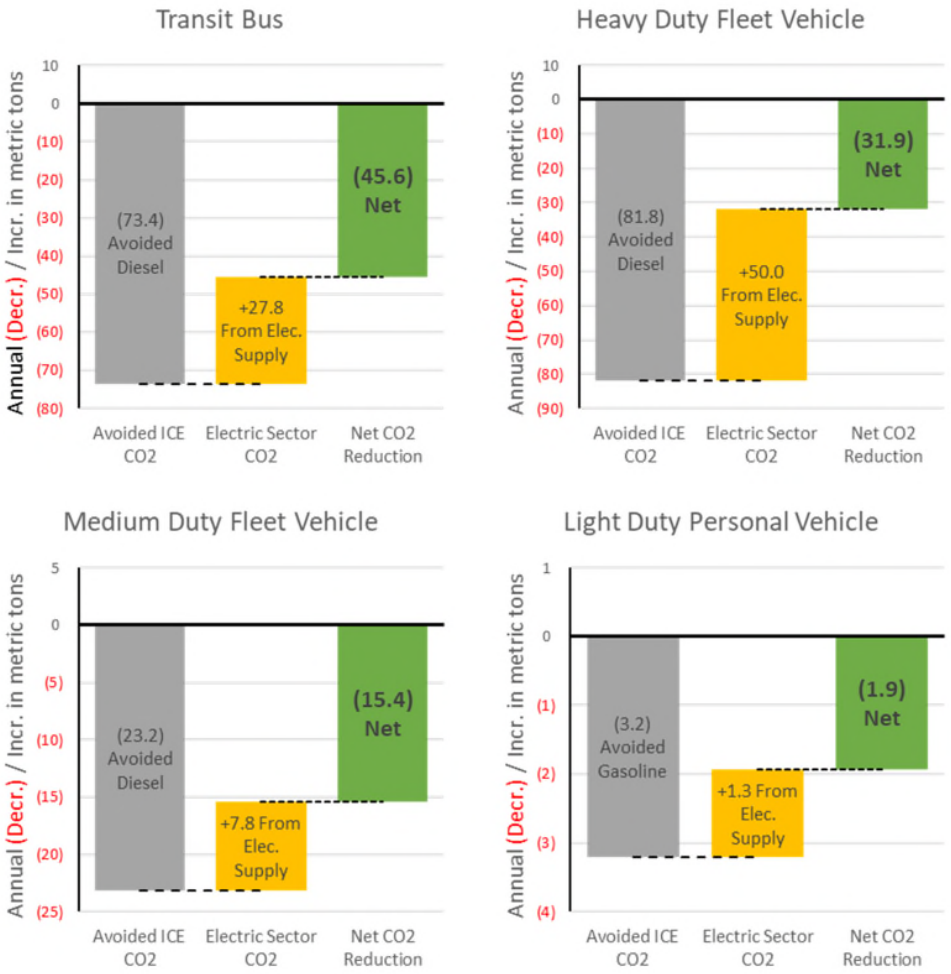
Climate and Health Impacts

Beneficial electrification programs improve climate and health outcomes for Illinoisans in two ways. First, BE replaces the combustion of fossil fuels with grid power, the composition of which depends on the generation mix in the region but will typically include zero-emissions or lower-emitting resources. Direct combustion of oil, gasoline, or natural gas is replaced with zero-emissions nuclear, wind, or solar generation, natural gas generation at fuel-efficient centralized power stations, and, decreasingly, from coal generation. Second, BE changes where the emissions occur. Relying on the electric system means that fossil fuel emissions, if any, will come from few, centralized power stations that are usually located in areas of lower population density and equipped to some extent with pollution controls and tall chimneys. In contrast, non-electrified fossil fuel combustion typically disperses emissions in areas of high population density at ground level (e.g., from a car's tailpipe). This dynamic means that BE can provide significant benefits to local air quality, especially in communities that have historically suffered from poor air quality.

The operation of many ICE vehicles involves a disproportionate amount of time idling, such as the use of refuse collection trucks, delivery trucks, school buses, or vehicles travelling through traffic congestion. This creates localized pockets of highly concentrated particulate matter and criteria air pollutant emissions, greatly harming local air quality. Some municipalities have implemented aggressive fines to combat the deleterious effects of excessive vehicle idling. Converting the vehicles to electric counterparts would eliminate these harmful tailpipe emissions.

All BE programs considered in ComEd's plan will create a net reduction in carbon dioxide emissions, the greenhouse gas that a consensus of scientists and experts understand is responsible for our changing climate. For reference, the annual carbon dioxide emissions benefit of replacing a typical (ICE) vehicle with an electric counterpart is shown in Figure III-1 for four different vehicle types.

Figure III-1: Annual CO2 Reduction from Electrifying Various Vehicles[29]



Reducing carbon emissions should lessen the impacts from climate change and in turn create benefits for society. The federal Interagency Working Group on Social Cost of Greenhouse Gases issued an interim estimate of the societal impact of carbon emissions at $51/metric ton, growing over time.[30] Each electric vehicle put on the road would be expected to create carbon reduction benefits worth hundreds or thousands of dollars to society each year. Once Illinois reaches its goal of putting 1,000,000 electric vehicles on the road, these vehicles will be responsible for millions of tons of CO_2 reductions per year, producing benefits to society valued at hundreds of millions of dollars annually.

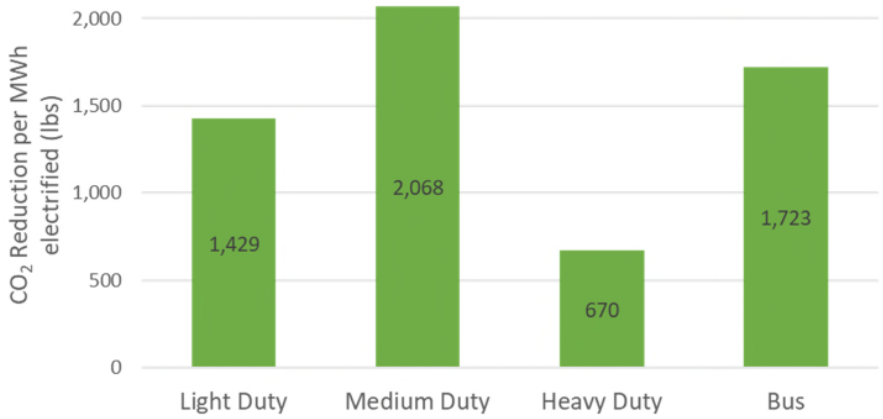
On a per megawatt-hour basis, BE is a potent carbon reduction measure, especially in Illinois. As the electric sector fuel mix shifts towards more zero carbon generation sources, the benefits of BE are

[29] These figures are based on calculations performed in conjunction with the benefit-cost analysis described in ComEd Witness Scott Vogt's testimony.

[30] Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990* (February 2021), https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

enhanced with a cleaner fuel mix because BE targets non-electric sector emissions and replaces them with an increasingly clean generation portfolio.

Figure III-2: Approximate Net CO2 Reductions per Megawatt-Hour[31]



Moreover, the carbon dioxide reductions from BE are only a portion of BE's overall climate and health benefits. Emissions of other criteria air pollutants that directly affect local air quality are reduced through BE programs. For example, electrification that displaces the use of gasoline or other petroleum products will produce a net reduction in total emissions of nitrogen oxides, carbon monoxide, particulate matter, volatile organic compounds, and ammonia; if the electrified demand is met with no or little coal generation, sulfur dioxide emissions will be reduced as well.

Academics have estimated the potential societal benefits of public air quality improvements associated with EV adoption in the Chicago metropolitan area to be the third highest total among the 53 major U.S. cities examined.[32] It is no surprise that the health and climate benefits of electrification are pronounced in Illinois. First, a disproportionate number of vehicle miles are driven in areas of high population density, with deleterious impacts on local air quality that affect a large number of people. Second, the environmental benefits of electrification are maximized in Illinois, and particularly in northern Illinois, due to its availability of clean energy.

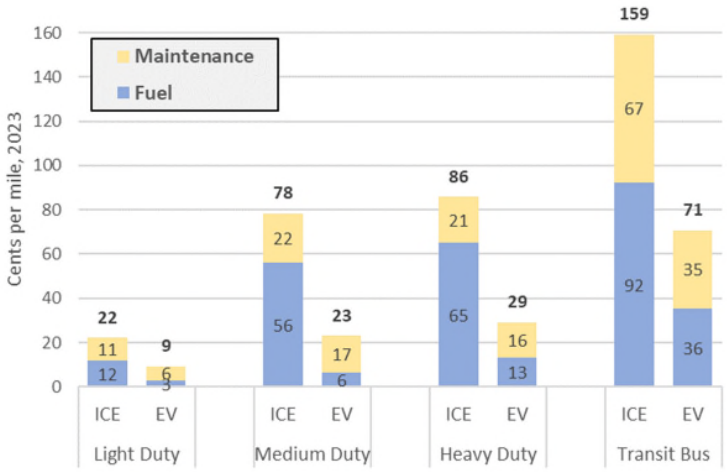
Lower Costs and Grid Benefits

Electric vehicles are appealing options to vehicle operators in large part due to their lower annual operating costs. Maintenance costs are lower on average for electric vehicles due to the simpler nature of the machine. With only around 20 moving parts compared to the more than 2,000 of typical ICE vehicles, EVs avoid many traditional ongoing maintenance expenses. For example, electric vehicles do not need oil changes and there is no traditional transmission system. EV drivers also save on fuel due to the efficiency of EV engines and their use of electricity in place of gasoline. AAA reports that 2021 average

[31] These figures are based on calculations performed in conjunction with the benefit-cost analysis described in ComEd Witness Scott Vogt's testimony.
[32] Choma, Ernani et al., *Assessing the health impacts of electric vehicles through air pollution in the United States*, Environment International, at 7 (2020).

fuel costs for an electric vehicle were 44 to 77 percent lower than non-hybrid light-duty passenger ICE vehicles, depending on the type of ICE vehicle.[33] These savings can be enhanced in high gasoline price environments or when the replaced ICE vehicles are ones that log high annual mileages or have suboptimal fuel efficiency due to stop-and-go driving in congested areas, idling, or other factors. Besides saving money for drivers, EV adoption also helps the U.S. move towards energy independence since it replaces consumption of petroleum (largely sourced internationally) with electricity (generated from a broad mix of nearly exclusively domestic resources). Lower demand for gasoline from EV adoption can limit price volatility for those who continue to rely on ICE vehicles. As shown in Figure III-3, these fuel and maintenance savings are a feature across all vehicle types, including heavy-duty vehicles and buses.

Figure III-3: Projected Fuel and Maintenance Costs, 2023[34]



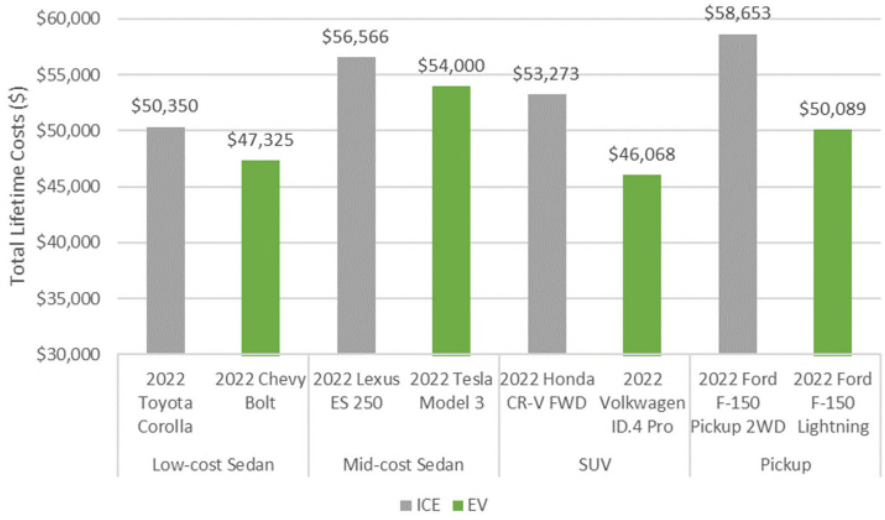
Offsetting these operating cost savings are higher upfront purchase costs for EVs. Only two 2022 EV models have a base purchase price below $30,000 and only eight have a base purchase price below $35,000.[35] Nonetheless, these purchase costs are often mitigated by federal and state tax incentives. Most EVs qualify for a federal tax credit of up to $7,500 and Illinois offers, if funds are available, an EV rebate of $4,000 starting July 1, 2022, $2,000 starting July 1, 2026, and $1,000 starting July 1, 2028.[36] Together, these incentives could represent a rebate of up to 42% of the purchase price of an electric vehicle. Further, as automakers continue to scale up production of electric vehicles, the Manufacturer's Suggested Retail Price of many models has dropped year-over-year, even as range has improved.[37]

All-in on a lifetime basis, EVs compare favorably to ICE vehicles; current data suggest that a new EV is less expensive to own than an ICE counterpart. A February 2022 analysis by Atlas Public Policy

[33] AAA, *Your Driving Costs,* at 6-7 (2021), https://newsroom.aaa.com/wp-content/uploads/2021/08/2021-YDC-Brochure-Live.pdf. Figures in each vehicle category are the average costs for five top-selling 2021 models selected by AAA.
[34] These figures are based on calculations performed in conjunction with the benefit-cost analysis described in ComEd Witness Scott Vogt's testimony.
[35] Mark Kane, E*lectric Car Price Comparison For US: Cheapest To Most Expensive*, Inside EVs (Sep 20, 2021), https://insideevs.com/news/534027/electric-car-prices-us-20210918/.
[36] 415 ILCS 120/27.
[37] For example, the MSRP of the base Nissan Leaf fell by $4,270 between the 2021 and 2022 models; the MSRP of the base Hyundai Kona Electric fell by $3,390 between the 2021 and 2022 models.

compared the total costs of ownership for the top selling ICE vehicle in four categories and for a comparable EV. In each case, the total cost of ownership was lower for the EV, as shown in Figure III-4:

Figure III-4: ICE vs EV Total Cost of Ownership[38]



The first two EVs considered are from manufacturers whose vehicles are no longer eligible for the current $7,500 federal tax incentive; even without the tax credit, the total costs of these models are lower than its ICE competitor by more than $2,500. Even among the EVs above that benefit from the federal tax credit, one would have lower costs of ownership without it (Ford F-150 Lightning) and the other would be within $300 of total cost parity (Volkswagen ID.4). The cost of ownership is expected to tilt even further in favor of electric vehicles as the EV construction industry matures and prices decrease over time.

Further, some forms of beneficial electrification have the potential to provide services to the electric grid, reducing total system costs and enhancing grid stability. For example, some electric vehicles can be configured to provide energy back to the grid, whether as a peak hour resource to alleviate local outages, or to provide ancillary services like frequency regulation. Even if an EV does not provide power back to the grid, it can be a valuable resource through optimized charging, whereby a vehicle with flexible charging needs can receive a variable level of electricity from the grid depending on real-time grid conditions. Electric school buses – when not serving their primary busing function – may be able to use their batteries to provide ancillary services like frequency regulation or spinning reserves to the grid for many hours of the day. These services can create reliability and grid stability benefits that lower costs for all customers.

[38] Taylor, Tom and Josh Rosenberg, *Total Cost of Ownership Analysis*, Atlas Public Policy (February 2022), https://atlaspolicy.com/wp-content/uploads/2022/01/Total-Cost-of-Ownership-Analysis.pdf. $7,500 federal tax credit applied for eligible vehicles (i.e., Volkswagen ID.4 and Ford F-150 Lightning). Costs based on eight-year life, with resale value after eight years deducted from total costs. Total Cost of Ownership does not include environmental benefits.

Environmental Justice and Equity

Certain Northern Illinois communities, such as its Environmental Justice and Restore, Reinvest, Renew communities, have disproportionately suffered from local and harmful emissions from combustion vehicles. Electrification provides an opportunity to reduce the levels of air pollutants in these areas where it would benefit most. There is a strong correlation between the location of EJ and R3 communities and areas of lower incomes. And the majority of residents in EJ and R3 communities are people of color.

For example, Figures III-5 and III-6 show a high-resolution snapshot of demographics and air quality in the Chicago area. The areas that the City of Chicago found to have the worst air quality and health indices are also neighborhoods where people of color make up a higher share of the population.

Figure III-5: Chicago Area Demographics[39]

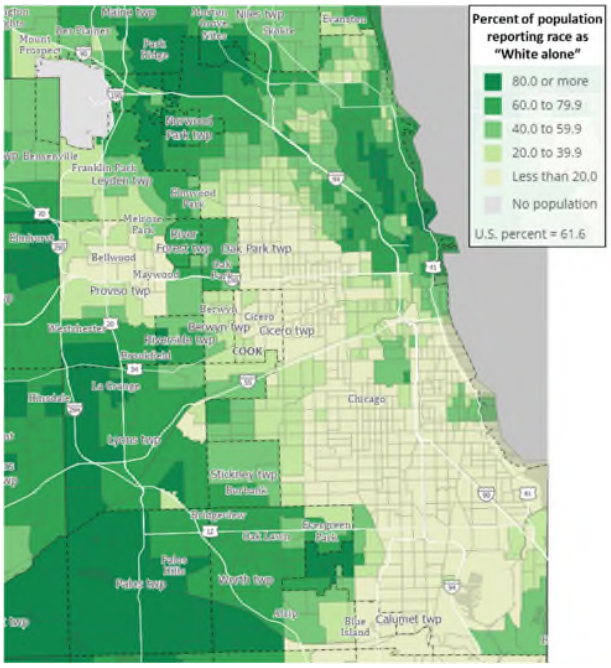
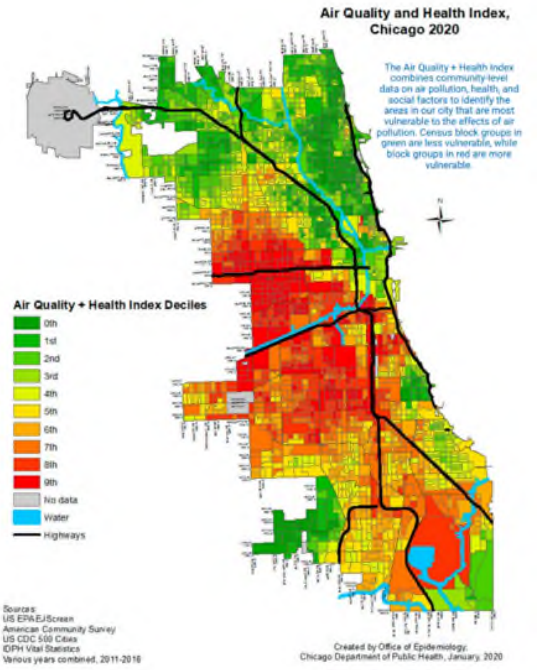


Figure III-6: Chicago Air Quality and Health Index[40]



Because these communities are also more likely to be in close proximity to industrial facilities or multimodal transportation hubs, they are already burdened with high levels of air pollutant emissions before factoring in the impact of personal transportation, buses, fleet vehicles, and other applications that can be most readily electrified today. Adding to the challenges that residents of these areas face, many do not have housing or employment options in areas with better air quality and often do not themselves own cars that contribute to the air quality issues. Figure III-7 shows the location of EJ communities in

[39] U.S. Census Bureau, *2020 Census Demographic Data Map Viewer*, https://www.census.gov/programs-surveys/geography/data/interactive-maps.html.
[40] City of Chicago, *Air Quality and Health Report*, at 7 (2020), https://www.chicago.gov/content/dam/city/depts/cdph/statistics_and_reports/Air_Quality_Health_doc_FINALv4.pdf.

northern Illinois, which overlap significantly with areas that have the highest concentration of households with no vehicle available, as shown in Figure III-8.

Figure III-7: EJ Communities in Northern Illinois[41]

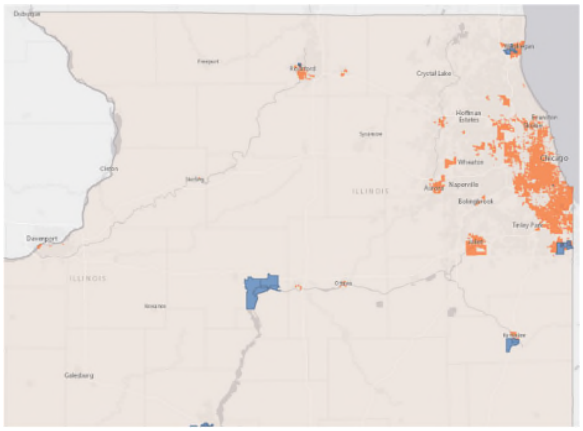
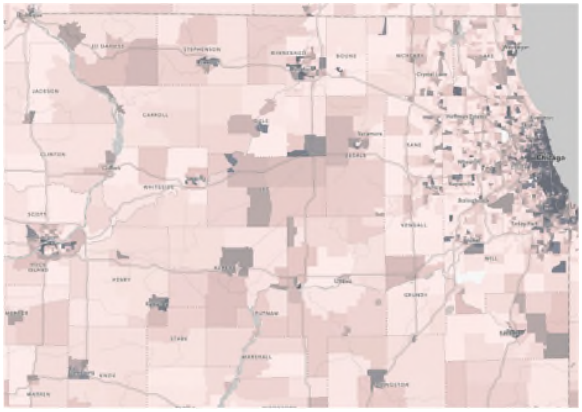


Figure III-8: Concentration of Households with No Vehicle Available[42]



Beneficial electrification provides an opportunity to make targeted emission reductions and air quality improvements in these communities. To the extent that EJ and R3 communities have high population density, the air quality improvements experienced there can benefit a large number of people. The Climate and Equitable Jobs Act recognized the importance of prioritizing low-income,[43] EJ, and R3 communities by requiring that utility program investments in make-ready infrastructure investments and electrifying medium-duty and heavy-duty buses will meet a certain threshold of investment. Considering that most EV adoption to date — and its associated benefits — have been experienced in high-income neighborhoods, directing funding towards low-income, EJ, and R3 communities will help ensure that BE benefits accrue there as well.

Economic Development

Electrification presents a unique opportunity for economic development. Most importantly, investing in the health and equity of its citizens is smart economic development policy for Illinois in addition to being the right thing to do. Electrification investment that lifts low-income, EJ, and R3 communities can lessen residents' transportation and environmental burdens, helping to unlock opportunities that were not previously available to wide swaths of the population. Healthy residents will

[41] Illinois Solar for All, *Map of Environmental Justice Communities,* https://elevate.maps.arcgis.com/apps/webappviewer/index.html?id=cfd020c99ed844668450c6b77eacb411 (last visited June 27, 2022). Areas in orange were designated through a multi-factor calculation; areas in blue are self-designated.

[42] ESRI ArcGIS data viewer, U.S. Census Bureau, American Community Survey, 2020, https://www.arcgis.com/apps/mapviewer/index.html?webmap=a16b9f8f0d594125aac60179b9bb9741 (last visited June 27, 2022).

[43] The statute refers to low-income communities, though it does not define "low-income communities." Instead, it defines "low-income" in terms of individuals and families. *See* 20 ILCS 627/45(b). Accordingly, ComEd understands "low-income communities" to encompass the community of low-income customers within ComEd's service territory. ComEd welcomes stakeholder feedback regarding this interpretation.

have better opportunities to achieve their full potential and local businesses will benefit from higher productivity. Advancing equity in Illinois will encourage the best and brightest students, citizens, and entrepreneurs to remain in Illinois and continue to invest into our communities.

Additionally, electrification creates investments in assets and infrastructure that will be installed, serviced, and maintained by local contractors and businesses. The cost savings that electrification unlocks create an opportunity for spending on other goods and services, leading to greater economic activity throughout the state of Illinois. Turning to electricity instead of petroleum for fuel needs will mean more dollars spent locally and domestically rather than sent to overseas petroleum conglomerates, which in turn will lead to a larger share of these revenues being reinvested in the local and domestic economies. Electric vehicle charging infrastructure and other smart community technologies can position an area as a hub of innovation, helping attract new jobs and increase economic growth. EV incentives are expected to have positive net impacts on economic growth: academics have estimated that the additional EV purchases encouraged by an $8,000/vehicle federal subsidy lead to GDP growth that exceeds the total cost of the subsidies by more than $1.4 billion per year.[44] An NREL paper on this topic estimated that if 14% of the total U.S. fleet is electric by 2035, economic benefits will accrue in the form of 52,000 jobs per year and an annual GDP benefit of $6.6 billion by then.[45]

[44] Zhenhua Chen et al., *Environmental and Economic Impact of Electric Vehicle Adoption in the U.S.*, Environmental Research Letters, at 10 (April 2021), https://iopscience.iop.org/article/10.1088/1748-9326/abe2d0/pdf.
[45] Marc Melaina et al., *National Economic Value Assessment of Plug-In Electric Vehicles*, NREL, at v (December 2016), https://www.nrel.gov/docs/fy17osti/66980.pdf.

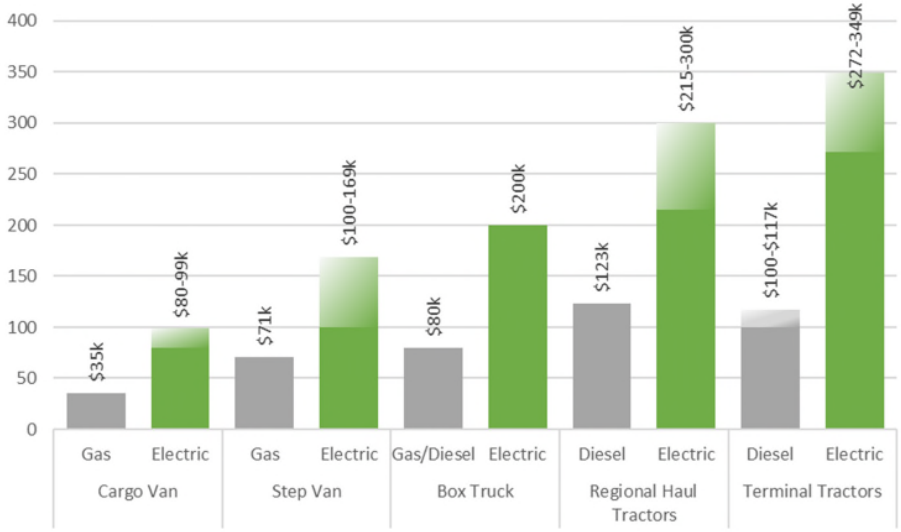
IV. Challenges to Beneficial Electrification

Upfront Purchase or Installation Costs

The first barrier that a potential BE adopter faces is the fixed, upfront cost of purchasing new equipment. Many of those eager to electrify may not do so until an existing device, system, or vehicle is fully depreciated or needs to be replaced. For example, a homeowner may not wish to incur the costs of installing a heat pump until their existing furnace or boiler ceases to function, or an automobile owner may not be prepared to purchase a new electric vehicle while their existing ICE vehicle is functional. Commercial or industrial organizations may be particularly exposed to the costs of replacing equipment that is not fully depreciated if they have systems with components of varying condition or vehicle fleets of different ages.

Even when a potential BE adopter is committed to purchasing or installing new equipment, a traditional option and an electric alternative will likely have different cost profiles. An option with higher upfront costs may be challenging for that potential BE adopter to select even if it produces ongoing savings or has lower expected total lifetime costs. This is especially true presently for large electric vehicles such as fleet vehicles or buses, though EV purchase costs are expected to decline as the market evolves and production increases. As shown in the following figure, vehicle summaries prepared by the North American Council for Freight Efficiency report an upfront cost of a new medium- or heavy-duty electric vehicle that currently exceeds its gas or diesel counterpart.

Figure IV-1: Sample Purchase Price of Fleet Vehicles[46]



[46] NACFE, *Run on Less Market Segment Fact Sheets* (2021), https://nacfe.org/run-on-less-electric-report/. Purchase prices for electric models may decline after 2021 as production levels of these models increase and market segment evolves. Electric Regional Haul Tractor price based on Lonestar Class 8 and Lion Electric Lion 8T models, cited in PG&E, *EV Fleet Program*, https://www.pge.com/pge_global/common/pdfs/solar-and-vehicles/clean-vehicles/ev-fleet-program/PGE_EV-Fleet_Vehicle-Availability_Distribution-Delivery.pdf.

Despite the allure of O&M and fuel savings that could offset this cost difference and produce net savings over the vehicle's lifetime, a business, school district, or transit agency may not be in a position to purchase the electric vehicle due to annual budget or capital constraints.

Personal electric vehicles are another example. Despite the lifetime cost savings seen in Figure III-4 in the previous section, unlocking these savings requires a higher upfront expenditure. A recent CUB study cited purchase prices for personal electric vehicles that ranged from $27,400 (Nissan Leaf) to $45,000 (Tesla Model 3) and suggests that "EVs are typically 10-15% more expensive than comparable gasoline models."[47] The upfront cost difference can be a significant barrier for many light duty automobile customers, who may only be able to purchase the EV with a larger down payment or under higher financing costs. Federal and state subsidies have been created to help address the upfront cost disparity between EV and ICE vehicles. Nonetheless, the benefits of these subsidies cannot typically be captured at the time of purchase. The federal tax incentive, if available, would not be received until the EV adopter files their federal income tax return the following year. And, as currently structured, the federal income tax credit for qualifying EVs cannot exceed the purchaser's federal tax obligation. In practice, this means that someone who pays $20,000 in annual federal income tax can take the full tax credit (currently up to $7,500), while someone who pays $5,000 in annual federal income tax could only claim a $5,000 credit. Low-income adopters, to whom an EV's higher upfront cost would be more burdensome, are further disadvantaged by the current federal tax credit design.

Figure IV-1 shows only the cost differential of the purchase of an electric vehicle. To the extent that an adopter of an EV or any other BE technology must invest in ancillary equipment such as on-site vehicle charging infrastructure, those costs would exacerbate the upfront cost disparity that the EV adopter would face when choosing to electrify.

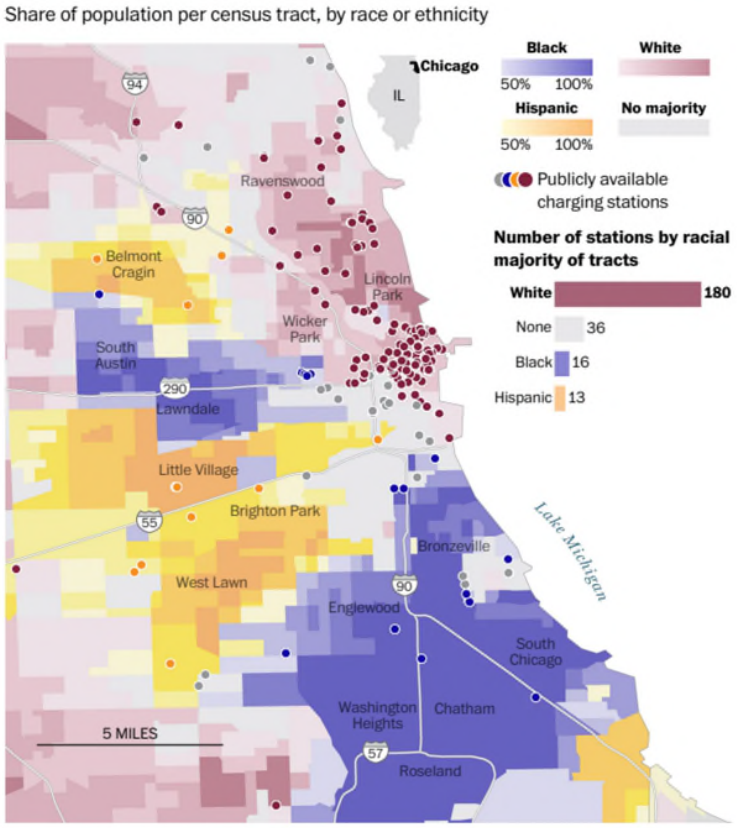
Inadequate Charging Access

A second barrier is inadequate charging access. Reaching CEJA's goal of one million EVs in Illinois will require building out a system of accessible charging infrastructure. Areas where too few chargers exist to support EV ownership may struggle to see the benefits of transportation electrification programs without focused support. Targeting areas lacking public charging infrastructure can help more people consider an EV as a viable option. At-home charging is not available for all would-be EV owners, so an expanded network of charging options near workplaces, shopping centers, and major travel corridors will be needed to support the massive increase in EV adoption required to meet legislative climate goals.

The private entities largely responsible for the existing buildout of public charging stations have prioritized high-income neighborhoods where more drivers have already been able to purchase an EV. The current fleet of public charging stations available nationwide is concentrated in high-income neighborhoods, leaving gaps where private for-profit entities have yet to develop. These gaps, known as "charging deserts," may exacerbate existing inequities. For example, in the Chicago area, accessible charging stations are predominantly located in majority white neighborhoods and substantially less likely to be located in majority Black or Latinx neighborhoods, as shown in the following figure.

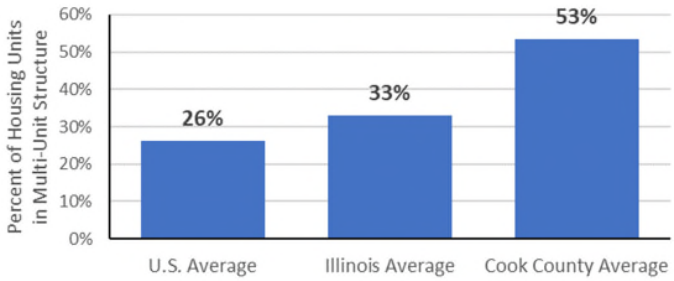
[47] Citizens Utility Board of Illinois, *The EV Buyer's Handbook*, at 4 (June 2022).

Figure IV-2: Chicago Area Electric Charging Stations and Population Demographics[48]



In areas of high population density, there is less physical space available and parking is expensive. Drivers without access to their own driveway or garage suitable for at-home charging will rely on the expansion of public charging options to consider electric vehicles. This applies to many ComEd customers that rely on street parking, live in multi-unit housing, or rent – renters may not have the option to install at-home charging infrastructure even if there is space for it. Illinoisans are more likely than the average American to live in a multi-unit dwelling; a household in Cook County is more than twice as likely to live in a multi-unit dwelling compared to the national average.

Figure IV-3: Prevalence of Multi-Unit Dwellings[49]



[48]Will Englund, *EV charging deserts leave Black communities unconnected*, Washington Post (December 9, 2021).
[49] U.S. Census Bureau, *Selected Housing Characteristics, 2016-2020 American Community Survey 5-Year Data Profile*, https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/.

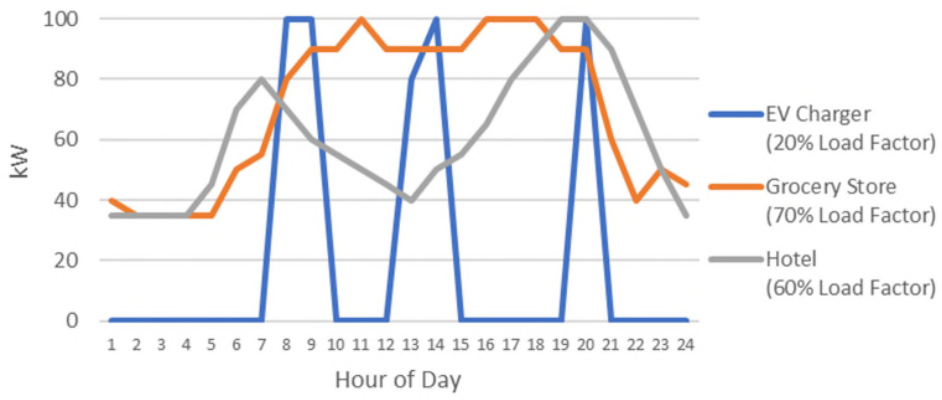
Public Charger Economics

The development of public EV chargers is often described as a "chicken or the egg" problem: public charging enterprises are reluctant to install chargers until there are more EVs on the road, but potential EV drivers are reluctant to purchase EVs without sufficient public charging options. Unsurprisingly, the economics of public charging providers are highly dependent on the extent to which the charger is utilized.

While the pricing structure that the charging provider applies to its customers can vary, typically the charging customers pay by the minute or by the kilowatt-hour. In either configuration, the revenue a public charger generates will be a direct (or nearly direct) function of the overall public usage of the charger and the kilowatt-hours of electricity it provides. The costs the charging provider faces when adding a new station, however, are a combination of fixed charges (such as upfront installation costs) and variable costs (such as some components of their electric charges). Thus, a disconnect between the timing of costs and revenues may deter charging providers from constructing new chargers, especially if there are not enough electric vehicles on the road.

Some charging providers or fleet operators note challenges that arise from the default distribution rate structure for non-residential customers, which includes a per kilowatt-hour volumetric charge as well as a per-kilowatt demand charge that is tied to the highest instantaneous level of electric usage across a set of hours. Demand charges typically account for a greater portion of total electric bills for charging providers than the average customer due to their usage profile, which alternates between high demand and no demand.

Figure IV-4: Illustrative Daily Usage Pattern



To the extent that more electric expenses can be tied to kilowatt-hour consumption rather than demand charges, public charging provider revenues can be more closely coupled with costs, reducing economic risk inherent to the public charging business model.

Insufficient Education

ICE cars are familiar and have become culturally significant. Until people learn more about electric vehicle charging and test drive one, the technology may feel unfamiliar and different. Would-be adopters may be ill-informed or misinformed about the EV ownership experience and may not embrace EV adoption until they better understand the benefits of EV ownership.

Increased education about EV ownership can help spur adoption. If more people better understand the similarities and differences between EV and ICE ownership, they may be more inclined to purchase an EV and unlock benefits, such as the expected lower total cost of ownership (for passenger vehicles). Focusing education on common misconceptions about EVs or issues potential drivers worry about is important to maximizing the effectiveness of a comprehensive electrification strategy. These include:

Costs – upfront costs vs. lifetime ownership costs

The purchase price of a typical at-home Level 2 charger is not expensive compared to the price of an electric vehicle, and considering the cost of residential electricity, all-in fuel costs of an electric vehicle can provide cost-savings compared to the lifetime ownership of ICE vehicles. Those with the disposable income to make the up-front purchase of an EV can experience overall cost savings when comparing the lifetime ownership of an EV to that of a traditional gasoline-powered car. Lifetime savings such as lower maintenance costs, lower fueling costs, and federal, state, or utility tax incentives do not appear on the vehicle's sticker price. When customers can better estimate and visualize these savings, they can make confident, informed decisions about EV adoption.

Charger Accessibility

While a lack of chargers can constrain EV development in charging deserts, charging options come in many forms. With better education about all available options of charger types, locations, payment options, etc., more drivers may become interested in EVs. Many drivers may not be aware of the variety of options available for EV charging. Some may be unaware that an electric vehicle can charge from a standard 120-volt outlet with no additional upfront expense, or that this Level 1 charging could provide enough electricity overnight to satisfy many charging requirements. Mobile applications help EV drivers find alternative charging options and purchase electricity on-site with varying terms. Chargers in ComEd's service area are located in all types of places where cars are parked: parking garages, shopping centers, convenience stores, government buildings, health centers, schools, restaurants, and others. Direct current fast chargers can recharge an EV much faster than at-home chargers. Depending on their transportation needs, some drivers may be able to rely solely on public fast charging.

To meet common electrification goals, numerous public and private entities continue to invest in charger accessibility and provide various incentives to further develop charging networks. Increased education of charging purchase options – like charger rebates – can better inform car buyers considering electric vehicles. Increasing awareness and understanding of legislative goals and programs can help increase their effectiveness.

Range Anxiety

Drivers commonly cite concerns about the distance an EV can travel on a fully charged battery as barrier to EV adoption. However, these drivers may not realize the number of regional destinations that are within a single charge. As most new EVs have a driving range that exceeds 210 miles, many destinations across Illinois and nearby states are reachable with a full battery from most locations within ComEd's service area.

Table IV-5: Distance to Regional Destinations from Cities in ComEd Service Area[50]

		Origin			
		Chicago	**Rockford**	**Naperville**	**Kankakee**
Destination	**Springfield, IL**	**202**	**199**	**178**	**159**
	Champaign, IL	**134**	**185**	**143**	**75**
	Indianapolis, IN	**182**	*272*	**204**	**147**
	Milwaukee, WI	**92**	**95**	**105**	**150**
	Davenport, IA	**178**	**130**	**151**	**170**
	Grand Rapids, MI	**179**	*267*	**205**	**205**

Better education about range anxiety can help increase the rate of EV adoption and increase the effectiveness of this plan's programs. A combination of market dynamics that continue to make batteries more affordable and investment in charger accessibility will help ease range anxiety. More efficient and more affordable battery technology will help make EVs viable for commuters with long distance routes or limited access to charging options. And given the current and scheduled offerings of EV models with larger batteries, range anxiety may soon cease to be a problem for those that can find time to charge.

Accommodating Increased Demand on the Electric System

To unlock the benefits of electrification, the electric grid must be capable of accommodating the additional demands that newly electrified demand will place on it. The grid impact at the local distribution level can be significant for some beneficial electrification applications, such as high voltage DCFC stations. If EV charging stations are clustered or sized for large vehicles such as buses, full utilization of these chargers can dramatically change the amount of power used beyond the levels that local substations or other equipment are designed to safely serve. The distribution system may need to be built out or modified in a way that can handle the higher peak loads and increased demands that are placed on it. To the extent that hourly rates or other off-peak charging incentives can be implemented to encourage EV charging during periods of lower system utilization, EV charging demand could be more efficiently served. Further, ComEd's short-term and long-term infrastructure investment planning process will need to be carefully configured to respond to and anticipate the changing demands on the grid. Cooperation and coordination between ComEd, vehicle owners, and charging providers will be essential to ensure a smooth integration of charging load, particularly for fleet applications where many high-demand vehicles may be charging at the same time.

[50] Distance of recommended driving route via Google Maps.

Additionally, sufficient – and reasonably cost-effective – generating resources must generate the megawatt-hours needed to power the electrified vehicles, equipment, and devices. According to EPRI's 2018 *U.S. National Electrification Assessment*, a transformative electrification scenario consistent with a 67% economy-wide reduction in CO_2 emissions reductions would require an increase in total annual electric generation of over 50%.[51] New and existing market and policy mechanisms will help facilitate this transition and create price signals for new resources; namely, Illinois's recently expanded Renewable Portfolio Standard ("RPS"), its 2045 carbon-free standard, and the regional long-term resource adequacy planning by the PJM Interconnection. Given the projected need for greater generation capability, Illinois's efforts to preserve and protect its large, baseload, zero emission nuclear generators were especially prescient.

[51] EPRI, *U.S. National Electrification Assessment*, at 8 (April 2018). https://ipu.msu.edu/wp-content/uploads/2018/04/EPRI-Electrification-Report-2018.pdf.

V. ComEd's Beneficial Electrification Plan

In order to capture the benefits of and lessen the barriers to Beneficial Electrification, ComEd proposes implementing a number of programs for its customers. The ComEd BE Plan contains several core programs ("BE Plan Programs"), which are described in greater detail throughout this section:

Table V-1: Summary of ComEd BE Initiatives

PROGRAM NAME	ANNUAL FUNDING
Residential Program	$15M
C&I and Public Sector Program	$63M
Customer Education and Awareness Program	$9M
BE Pilot Program	$5M
Portfolio	$8M
Total:	**$100M**
ADDITIONAL BE ELEMENT New EV Charging Delivery Classes	N/A

Through these Programs, ComEd will invest $100 million dollars per year in each of the next three years towards measures that will improve access to BE technology, promote equity and environmental justice, and reduce carbon and surface-level pollution throughout northern Illinois. Within each Program listed above are various Sub-programs described in greater detail in the following pages, each of which will target a specific category of BE measure, BE infrastructure, or other avenue to encourage, support, and facilitate BE adoption in ComEd's service area. In addition to these Programs, ComEd is simultaneously proposing two dedicated Electric Vehicle Charging Delivery customer rate classes for nonresidential customers.

The BE Plan Programs will provide funding to a broad array of BE applications, focused primarily on EV adoption and achieving carbon and surface-level pollutant reductions for low-income, EJ, and R3 communities. Throughout the workshop process, ComEd heard a clear, consistent message from stakeholders about the importance of providing meaningful improvements in air quality to these communities and pursuing electrification opportunities across many types of electric vehicles – including delivery vans, fleet vehicles, buses, and trucks, in addition to personal electric vehicles. This will ensure that the benefits of electrification accrue in areas that suffer a disproportionate environmental burden and benefit ComEd customers who may not own an automobile.

Within its Residential Program, ComEd will offer enhanced rebates for low-income customers and those residing in EJ or R3 communities. Similarly, the C&I and Public Sector Program will offer enhanced rebates for customers located in or primarily serving Environmental Justice or R3 communities. Typically, the enhanced rebate is sized to be 50% larger than the base rebate. This recognizes the magnified importance of reducing surface-level pollutants in EJ and R3 communities and addressing upfront purchase cost barriers for low-income customers and those located in EJ or R3 communities. To facilitate a robust EV marketplace and to provide additional options to customers for whom the purchase cost may be a barrier, used EVs purchased by low-income customers or those residing in EJ or R3 communities are eligible for a rebate sized at 50% of the new vehicle incentive.

To ensure access for low-income customers and those residing in EJ or R3 communities, and to promote a goal of directing over 40% of Residential Program and C&I and Public Sector Program funds towards supporting EV and BE adoption by those applicants, ComEd has elected to target a portion of its funding dedicated to this purpose. This is directly in response to stakeholder feedback. Nothing will preclude low-income applicants and those from EJ or R3 communities from receiving more than this target amount.

As ComEd gauges customer response and uptake (as well as the introduction and evolution of any complementary state or federal incentives that impact BE measure economics), it may adjust its plan in future years. To the extent that ComEd expects that a smaller or larger rebate for a given measure would more effectively spur BE adoption, ComEd will modify its rebate level accordingly. ComEd may reallocate funding across the BE Plan in subsequent years in response to customer demand while continuing to invest $100 million annually through 2025 into cost-beneficial BE programs. ComEd proposes a degree of budget flexibility given uncertainty regarding customer uptake of the proposed programs. If uptake is less than expected, ComEd would roll unused funds forward to the next year, provided that no rate impact caps would be violated. And to address stronger than expected uptake, ComEd may spend up to 25% more than the budget in any year during a multi-year BE plan period (again, so long as statutory rate impact caps are not violated), and the budget for subsequent years during the multi-year BE plan will be correspondingly reduced. Should ComEd make significant changes to the budget for a given BE Plan Program (i.e., an increase or decrease in budget funding for a Program of more than 25%), ComEd is willing to notify stakeholders through an informational filing within the docket of the most recent ICC-approved BE Plan. As ComEd's BE Plan evolves, there will be ample opportunities for informal and formal feedback and robust stakeholder participation in shaping its future; per the requirements established in the Electric Vehicle Act, ComEd will file a BE Plan update every three years, with its first update to be filed on July 1, 2024.[52]

1. Residential Program

The Residential Program will allocate $15 million annually to sub-programs that incentivize the purchase and installation of new BE measures. The program will distribute upfront funding for a wide variety of applications, primarily for electric vehicles but also including non-transportation BE categories. Those who purchase an electric vehicle or other approved electric equipment will be eligible to apply for

[52] 20 ILCS 627/45(f).

a one-time rebate that can offset the purchase cost of the measure. The Sub-programs of the Residential Program and the size of the rebates are summarized in the following table:

Table V-2: Residential Program Summary

Sub-program	Eligible Measures	Rebate Value	Annual Budget
Residential EV Purchase Sub-program	Passenger Vehicle	$4,000	$6M
	LI/EJ/R3 Passenger Vehicle	$6,000	
	LI/EJ/R3 Used Passenger Vehicle	$3,000	
Residential EV Charging Infrastructure Sub-program	Residential Charging Infrastructure	Up to $2,500	$5M
	LI/EJ/R3 Charging Infrastructure	Up to $3,750	
Residential BE Technology Adoption Sub-program	Supplemental Rebates for High Efficiency Electric Heat Pumps	Up to $3,000	$2M
	Electric Lawn Equipment	$25-$50 per unit	$1M
	Induction / Electric Cooktops	$100-$500 per unit	
	Electric / Heat Pump Clothes Dryers	$50-$200 per unit	
Residential BE Infrastructure Readiness Sub-program	Residential BE Infrastructure	Up to $750 per res. unit, capped at $5,000 for multi-family	$1M

These rebates will help spur EV and BE adoption by combatting the upfront cost barrier that potential BE adopters face. The upfront purchase cost disparity between electric and ICE vehicles is particularly challenging for low-income personal vehicle owners, to whom vehicle purchase costs can represent a large portion of short-term disposable income. The enhanced rebate incentive for low-income customers and residents of EJ and R3 communities meets ICC Staff's suggestion for such a purchase rebate.[53]

As a condition of receiving a Residential EV Charging Infrastructure Sub-program rebate, ComEd requires that the customer enrolls in ComEd's Basic Electric Service Hourly pricing program (Rate BESH) for at least three years. This requirement will provide a strong incentive to ensure that the customer's EV charging occurs during off-peak hours. Hourly pricing provides the clearest signal to a customer of the relative cost to the electric system of charging at that time. This requirement mirrors a recommendation

[53] Illinois Commerce Commission Beneficial Electrification Workshops Staff Report to the Commission, at 65 (March 30, 2022) ("BE Workshops Staff Report").

from the ICC Staff BE Workshop report that ComEd include residential make-ready incentives, but that these incentives be contingent upon enrollment in enrollment in a time-variant rate.[54]

The following pages describe the Sub-programs of the Residential Program in more detail.

1.1 Residential EV Purchase Sub-program

- **Annual Budget:** $6M
- **Eligible Measures:**
  - Passenger Vehicle Rebate: $4,000/vehicle
  - LI/EJ/R3 Passenger Vehicle Rebate: $6,000/vehicle
  - LI/EJ/R3 Used Passenger Vehicle Rebate: $3,000/vehicle
- **Sub-program Description:** The Residential EV Purchase Sub-program offers residential customers a financial incentive for the purchase of new passenger electric vehicles, and low-income residential customers or those located in EJ or R3 communities a financial incentive for the purchase of new or used passenger electric vehicles. Passenger cars are defined as any Class 1 (<6,000 lbs.) or Class 2 (6,001-10,000 lbs.) vehicles that are registered for personal, non-commercial use. Purchases can be made at any dealership or retailer that sells qualifying vehicles. Within this sub-program, higher incentive values are provided to low-income customers and those residing in EJ or R3 communities.
- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the design, develop marketing materials, and conduct related marketing and outreach activities.
- **Target Market:** The sub-program seeks to engage residential customers in ComEd's service territory, including low-income customers and those residing in EJ or R3 communities. All our customers in these areas taking delivery service from ComEd are eligible for this sub-program regardless of their choice of supplier.
- **Marketing Strategy:** ComEd will leverage multiple tactics and channels to drive sub-program awareness, EV adoption, and participation similar to the marketing strategies used by ComEd's Energy Efficiency Retail program. In addition, ComEd will perform targeted outreach in support of EV adoption by low-income customers and those residing in EJ or R3 communities.

1.2 Residential EV Charging Infrastructure Sub-program

- **Annual Budget:** $5M
- **Eligible Measures:**
  - Residential Charging Infrastructure Rebate: Up to $2,500
  - LI/EJ/R3 Charging Infrastructure Rebate: Up to $3,750
- **Sub-program Description:** The Residential EV Charging Infrastructure Sub-program provides incentives for the installation of electric vehicle charging stations for residential customers who enroll in ComEd's Hourly Pricing program under Rate BESH (Basic Electric Service Hourly Pricing)

[54] BE Workshops Staff Report at 36, 69.

for at least three years. Within this sub-program, higher incentive values are provided to low-income customers and those residing in EJ or R3 communities.

- **Delivery Strategy:** An implementation contractor(s) will deliver the program and will work with ComEd to finalize the sub-program design, develop marketing materials, and perform sub-program operations including incentive processing, engagement with the Certified Electric Vehicle Charging Station Installer network, and marketing and outreach activities.
- **Target Market:** This sub-program is designed to engage residential customers in ComEd's service territory, including low-income customers and those residing in EJ or R3 communities. All such customers who take delivery service from ComEd and are enrolled in ComEd's Hourly Pricing program under Rate BESH are eligible for this sub-program.
- **Marketing Strategy:** ComEd will leverage multiple tactics and channels to drive sub-program awareness and participation, similar to the marketing strategies utilized by ComEd's Residential Energy Efficiency Heating and Cooling program, which is both contractor- and customer-facing. In addition, ComEd will perform targeted outreach in support of measure adoption by low-income customers and those residing in EJ and R3 communities.

1.3 Residential BE Technology Adoption Sub-program

- **Annual Budget:** $3M
- **Eligible Measures:**
  - Supplemental Rebates for High Efficiency Electric Heat Pumps: up to $3,000 ($2M annual budget)
  - Electric Lawn Equipment: $25-50 per unit; Induction / Electric Cooktops: $100-$500 per unit; Electric / Heat Pump Clothes Dryers: $50-200 per unit ($1M annual budget)
- **Sub-program Description:** This sub-program offers rebates for residential customers to support the adoption of selected beneficial electrification technologies, specifically high efficiency electric heat pumps, electric lawn equipment, induction cooking equipment, and electric clothes dryers. Heat pump rebates will be targeted primarily to low-income multifamily customers, with flexibility to target other customer markets with high barriers to adoption.
- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the sub-program design, develop marketing materials, and perform sub-program operations including incentive processing, marketing and outreach activities. As ComEd finalizes the design of Energy Efficiency Electrification ("EEE") program efforts targeting similar measures, the specific delivery channels of the Residential BE Technology Adoption Sub-program will be tailored to complement those EEE customer offerings to further lower barriers and drive market adoption.
- **Target Market:** This sub-program is geared towards residential customers in ComEd's service territory and has a focus on customers residing in multi-family buildings who are either low-income or located in EJ or R3 communities. These customers, who take delivery service from ComEd, are eligible for this sub-program regardless of their choice of supplier. Most of these rebates will be made available to all customers (electric lawn equipment, induction cooking equipment, and electric clothes dryers), but with higher rebates provided to low-income customers or those residing in EJ or R3 communities, similar to ComEd's Energy Efficiency Retail

program. Rebates for high efficiency electric heat pumps will be primarily targeted to multi-family customers (specifically, property owners) to assist in lowering barriers to multi-family building electrification.

- **Marketing Strategy:** ComEd will leverage multiple tactics and channels to drive sub-program awareness and participation similar to the marketing strategies utilized by ComEd's Energy Efficiency Retail program. In addition, ComEd will perform targeted outreach in support of measure adoption by low-income customers and those residing in EJ or R3 communities. For the high efficiency electric heat pump rebates, ComEd will primarily leverage ComEd's Energy Efficiency Multi-Family Upgrades program targeting income eligible customers to drive adoption.

1.4 Residential BE Infrastructure Readiness Sub-program

- **Annual Budget:** $1M
- **Eligible Measures:**
  - Residential BE Infrastructure Rebates: Up to $750 per residential unit, capped at $5,000 for multi-family.
- **Sub-program Description:** This sub-program offers rebates for residential customers, including those in multi-family dwellings, focused on lowering the cost of electrical infrastructure upgrades associated with non-transportation BE adoption (e.g., heat pumps, water heaters, induction cooktops, etc.).
- **Delivery Strategy:** The Residential BE Infrastructure Readiness Sub-program rebates will be delivered alongside EEE program efforts to present a seamless experience for customers. An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the sub-program design, develop marketing materials, and perform sub-program operations, marketing, and outreach activities.
- **Target Market:** ComEd is targeting residential (single and multifamily) customers in its service territory, including low-income customers and those residing in EJ or R3 communities. As with other programs, any residential customer taking delivery service from ComEd is eligible for this Sub-program regardless of their choice of supplier.
- **Marketing Strategy:** ComEd will leverage the existing EEE Marketing strategy to co-promote electrical infrastructure rebates as a bundled offering alongside EEE rebates for key residential electrification technologies.

2. C&I and Public Sector Program

ComEd's C&I and Public Sector Program will dedicate $63 million of annual funding to promote fleet vehicles, public transit buses, school buses, new charging stations, and other non-transportation BE measures. The Program includes four sub-programs, several of which offer:

Table V-3: C&I and Public Sector Program Summary

Sub-program	Eligible Measures	Rebate Value	Annual Budget
C&I and Public Sector EV Purchase Sub-program	LDV Rebate	$5,000	$12.5M
	EJ/R3 LDV Rebate	$7,500	
	MDV Rebate	$20,000	$12.5M
	EJ/R3 MDV Rebate	$30,000	
	HDV Rebate	$50,000	$10M
	EJ/R3 HDV Rebate	$75,000	
	School Bus Rebate	$120,000	$6M
	EJ/R3 School Bus Rebate	$180,000	
	Transit Bus Rebate	$80,000	$6M
	EJ/R3 Transit Bus Rebate	$120,000	
C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program	EJ/R3 EV Charging Infrastructure Rebate, L2 Charger	Up to $8,000 per port	$10M
	EJ/R3 EV Charging Infrastructure Rebate, DCFC	Up to $1,000 / kW, min 50 kW	
C&I and Public Sector BE Technology Adoption Sub-program	Commercial & Industrial BE Rebate Pool (Custom)	Custom	$2M
C&I BE Infrastructure Readiness Sub-program	High Efficiency Electric Forklift Infrastructure Rebate	Up to $5,000 per unit, capped at $50,000 per facility	$4M
	Small Business BE Infrastructure Rebate	Up to $10,000 per customer facility	

By focusing on fleet vehicles and transport vehicles used by those who may not own a personal vehicle, ComEd is targeting emissions reductions that will benefit all customers. Providing vehicle purchase incentives targeted at medium-duty vehicles, heavy-duty vehicles, and buses, as was recommended in the ICC Staff report, will produce emissions reductions from some of the most emission-intensive vehicles, especially those that travel through EJ and R3 communities.[55] The upfront purchase cost disparity between electric and ICE vehicles can be particularly challenging for fleet owners and large vehicle operators, to whom vehicle purchase costs can represent an abnormally large portion of operating budgets. These fleets and buses can develop their supporting charging infrastructure with the aid of L2 and DCFC infrastructure rebates if they are located or primarily operate in EJ or R3 areas, in line with Staff suggestions.[56] Charging infrastructure rebates are not limited to fleets, however; multi-unit dwellings and public charging providers will be eligible for a rebate if and only if the charger is installed in an EJ or R3 community.[57]

[55] BE Workshops Staff Report, at 49, 56, 58.
[56] BE Workshops Staff Report at 38-39, 50, 52, 56.
[57] Responsive to BE Workshops Staff Report at 37, 41.

To ensure open access for all customers to these rebates, no single entity will be permitted to receive more than 5% of the funding from a given sub-program category in a year (with the exception of transit buses, for which there will be a limited pool of potential recipients). Nothing precludes an entity from receiving rebates up to the 5% limit in more than one category. For example, a delivery fleet customer with a mix of light duty and medium duty vehicles could apply for up to 5% of the annual rebate funding in the light duty category, up to 5% of the annual rebate funding in the medium duty category, and up to 5% of the annual rebate funding in the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program.

The following pages describe these C&I BE Rebates in more detail.

2.1 C&I and Public Sector EV Purchase Sub-program

- **Annual Budget:** $47M
- **Eligible Measures:**

Table V-4: C&I and Public Sector EV Purchase Sub-program Eligible Measures

Measure	Rebate/vehicle	Annual Budget
LDV Rebate	$5,000	$12.5M
EJ/R3 LDV Rebate	$7,500	
MDV Rebate	$20,000	$12.5M
EJ/R3 MDV Rebate	$30,000	
HDV Rebate	$50,000	$10M
EJ/R3 HDV Rebate	$75,000	
School Bus Rebate	$120,000	$6M
EJ/R3 School Bus Rebate	$180,000	
Transit Bus Rebate	$80,000	$6M
EJ/R3 Transit Bus Rebate	$120,000	

EV rebate categories are defined as follows:

- *Fleet vehicles, Light Duty* – any Class 1 or Class 2 electric vehicle registered for commercial use. Examples include taxis, utility vans, full-size pickups, and step vans.
- *Fleet vehicles, Medium Duty* – any Class 3-6 (10,001-26,000 lbs) electric vehicle registered for commercial use. Examples include walk-in delivery trucks, beverage trucks, and bucket trucks.

- *Fleet vehicles, Heavy Duty* – any Class 7 or 8 (26,001+ lbs) electric vehicle registered for commercial use. Examples include semi tractors and refuse trucks.
- *School bus* – any electric vehicle 35 feet or longer used for student transport by a K-12 educational entity.
- *Transit bus* – any electric vehicle 30 feet or longer used by a municipal, county, or regional public transit agency for transportation on public roads.

- **Sub-program Description:** The C&I and Public Sector EV Purchase Sub-program offers C&I customers financial incentives on electric fleet vehicles, including school and transit buses, that are registered in the state of Illinois. Within this sub-program, higher incentive values are provided to customers that are located in or primarily serve EJ or R3 communities.
- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the sub-program design, develop marketing materials, and perform sub-program operations including incentive processing, marketing, and outreach activities.
- **Target Market:** This sub-program targets all C&I customers. All such targeted customers taking delivery service from ComEd are eligible for this sub-program regardless of their choice of supplier. The sub-program will also specifically target and perform outreach in support of measure adoption by C&I customers located in or primarily serving EJ or R3 communities.
- **Marketing Strategy:** The C&I and Public EV Sub-program will leverage multiple tactics and channels to drive sub-program awareness and participation similar to the marketing strategies utilized by the ComEd Energy Efficiency Standard and Instant Discounts programs which are both contractor and customer-facing.

2.2 C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program

- **Annual Budget:** $10M
- **Eligible Measures:**
  - EJ/R3 EV Charging Infrastructure Level 2 Rebate: Up to $8,000/port, limit 10 ports
  - EJ/R3 EV Charging Infrastructure DCFC Rebate: Up to $1,000/kW, minimum 50 kW, limit $500,000
- **Sub-program Description:** The C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program provides incentives for the installation of electric vehicle charging stations for public sector entities and public charging facilities located in or serving EJ or R3 communities. Certified Electric Vehicle Charging Station Installers, as designated by the Commission through their application of Administrative Code Part 468, will submit pre-applications, to include an infrastructure assessment, on behalf of customers to reserve funding for projects. Certified installers then install the equipment in the customer's facility. Any individual customer will be limited to a total of ten Level 2 port rebates and/or up to $500,000 in total DCFC rebate value per year from this sub-program.
- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the design, develop marketing materials, and conduct related marketing and outreach activities.
- **Target Market:** This sub-program specifically targets public sector entities, (e.g., municipalities, transit agencies) and publicly accessible chargers located in or primarily serving low-income, EJ,

or R3 communities. All such targeted customers taking delivery service from ComEd are eligible for this sub-program regardless of their choice of supplier.

- **Marketing Strategy:** The marketing will be similar to Energy Efficiency's Standard incentive program: primarily contractor-facing with some customer-facing messaging to drive awareness and inform the customer how to access the incentives.

2.3 C&I and Public Sector BE Technology Adoption Sub-program

- **Annual Budget:** $2M
- **Eligible Measures:**
  - Commercial & Industrial BE Rebate Pool: custom rebates
- **Sub-program Description:** The C&I BE Technology Adoption Sub-program provides monetary incentives to business and public sector customers adopting qualifying BE measures. The incentive is determined based on the calculated emissions benefit of an upgrade to a specific application, equipment type, or system (this type of rebate is referred to as a "Custom" measure). Custom measures are identified and implemented based on site-specific factors. Technical assistance for select projects will be provided to assist in the evaluation and implementation of custom BE projects. The measure list is still under development, to complement EEE efforts, but potential measures may include, but are not limited to, material handling equipment, industrial process technologies, and electric agricultural equipment.
- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the sub-program design, develop marketing materials, and conduct sub-program marketing and outreach activities.
- **Target Market:** This sub-program targets all C&I customers. All such targeted customers taking delivery service from ComEd are eligible for this sub-program regardless of their choice of supplier and including customers who have opted out of EEE programs. The sub-program will also specifically target and perform outreach to C&I customers located in or primarily serving EJ or R3 communities.
- **Marketing Strategy:** ComEd will leverage multiple tactics and channels to drive sub-program awareness and participation, similar to the marketing strategies utilized by ComEd's Energy Efficiency Custom Incentive program.

2.4 C&I BE Infrastructure Readiness Sub-program

- **Annual Budget:** $4M
- **Eligible Measures:**
  - Small Business BE Infrastructure Rebate: Up to $10,000 per customer facility
  - High Efficiency Electric Forklift Infrastructure Rebate: Up to $5,000 incentive per unit capped at $50,000 per customer
- **Sub-program Description:** The C&I BE Infrastructure Readiness Sub-program offers rebates for two categories of infrastructure upgrades:
  - Small Business BE Infrastructure Rebate: Rebates for small business customers located in or primarily serving EJ or R3 communities to help cover costs associated with non-

transportation BE adoption (examples include but are not limited to heat pumps, water heaters, or commercial food service equipment).

- BE Forklift Infrastructure Rebate: Rebates for commercial and industrial customers to cover costs associated with upgrading from fossil-fuel driven forklift equipment to high efficiency electric (lithium-ion battery) forklift equipment.

- **Delivery Strategy:** An implementation contractor(s) will deliver the sub-program and will work with ComEd to finalize the sub-program design, develop marketing materials, and conduct sub-program marketing and outreach activities.
- **Target Market:** This sub-program targets small business customers (i.e., non-residential private customers with less than 200 kW peak demand and public customers with less than 400 kW peak demand located in EJ or R3 communities (Small Business BE Infrastructure Rebate) and commercial and industrial customers with forklift equipment (BE Forklift Infrastructure Rebate). All such targeted customers taking delivery service from ComEd are eligible for this sub-program regardless of their choice of supplier.
- **Marketing Strategy:** Marketing the Small Business BE Infrastructure Rebate will be integrated into ComEd's Energy Efficiency's C&I Incentive Offerings to convey a seamless, bundled incentive opportunity for eligible customers. The marketing will primarily be contractor-facing with some customer-facing messaging to drive awareness and inform the customer how to access/receive the incentives. Similarly, the BE Forklift Infrastructure Rebate will be marketed alongside a future EEE offering incentivizing the purchase of lithium-ion battery electric forklift equipment. This will likely be promoted primarily through distributors and equipment manufacturers with some customer-facing messaging focused on building awareness of the offering.

3. Customer Education and Awareness Program

ComEd will dedicate $9 million of BE Plan funding to Customer Education and Awareness efforts. This Program will endeavor to expand knowledge of EVs and the incentives available through ComEd's BE Plan to a wide range of customers, and to provide support for customers and fleets considering BE measures, as suggested by stakeholders and ICC Staff.[58] This effort will include targeted outreach to engage low-income customers, customers in Environmental Justice or R3 communities to help promote their adoption of BE measures and close any knowledge gap afflicting areas that currently have low levels of EV adoption or public EV infrastructure.

In addition to these initiatives, ComEd will continue the ongoing education and support efforts it has already implemented under the Public Utilities Act ("PUA"), including digital advising tools to inform customer decision-making across energy management solutions and offerings such as EV Toolkit 1.0, the Smart Assistance Manager, and EV Companion.

Efforts to be undertaken in the Customer Education and Awareness Program include:

- *Education and Awareness Marketing*: To expand general customer awareness of EVs, ComEd's educational tools, and incentives available through ComEd's BE Plan, ComEd will employ a host of tactics ranging from advertising and customer newsletters and bill inserts to community event

[58] BE Workshops Staff Report at 52, 56, 71, 74-75.

engagement and education. This effort will include targeted outreach to engage low-income customers and those in EJ and R3 communities, helping to secure robust participation from those groups.

- *C&I Fleet Assessment*: To support customer decision-making, ComEd will make available third-party fleet electrification feasibility assessments for C&I customers. A third-party vendor will work with eligible customers to collect, evaluate, and analyze fleet operations data and provide an assessment of the customer's electrification opportunity, costs, and benefits. For large managed accounts, account managers are the primary conduits for these assessments, and ComEd will leverage the managers' direct relationships with their C&I customers to make their availability known. Unmanaged customers will be targeted through direct outreach campaigns focused on customer type. In addition, ComEd will perform targeted outreach to C&I customers located in or primarily serving EJ or R3 communities.
- *Customer Educational Tools*: ComEd intends to make available online, self-service tools that support customer education and inform related decision-making and program access. ComEd's existing EV Toolkit is an example of this kind of tool delivered already under the purview of the PUA. Moving forward, ComEd intends to address range anxiety and customer confusion by making these tools more robust and personalized and intends to make available a Fleet Electrification Toolkit. This Fleet Electrification Toolkit is a web-based resource that allows potential EV fleet adopters to estimate vehicle costs and savings, explore charging options, learn about the pros and cons of EVs, discover rate options, and more.

4. BE Pilot Program

ComEd believes that in order to unlock the full potential of beneficial electrification, the company must continue to learn, gather data, and pursue a variety of innovative electrification strategies. To test and encourage nascent BE development concepts, ComEd envisions a robust combination of pilots and technical demonstration projects completed with stakeholders or other partnerships. ComEd proposes to dedicate $5 million to a BE Pilot Program each year for this purpose, in addition to ComEd's existing, ongoing efforts. Initial areas of focus are included below are targeted towards stakeholder ideas and recommendations from several parties:[59]

- *Air Quality Mapping Pilot* – ICC Workshop presentations from the Little Village Environmental Justice Organization ("LVEJO") and Warehouse Workers of America ("WWA") highlighted the need for air quality data to be collected at a hyper-localized, finely-granular level to understand the severity of air quality issues near heavily trafficked transportation hubs and other vulnerable areas. ComEd agrees, and it proposes to partner with LVEJO and WWA through an Air Quality Mapping Pilot that would deploy air quality sensors to study air quality within Environmental Justice or R3 communities.
- *School Bus Vehicle to Grid (V2G) Pilot* – Electrifying school buses can help mitigate the impact of diesel bus fumes on children's health, when operating and during the large amount of time school buses spend idling. Electric school buses are only needed to perform their primary busing function for a small fraction of the hours of the year and are otherwise parked at a depot where they could

[59] BE Workshops Staff Report at 54, 67, 80-81.

be interconnected to the wholesale electric grid and provide valuable services such as peak capacity, intra-day energy balancing, and minute-to-minute frequency regulation. This Vehicle-To-Grid ("V2G") concept is promising, however the revenues available from these services are subject to performance and market uncertainty and are not fully understood. A School Bus V2G Pilot would help parametrize the potential grid revenues available to electric school buses.

- *Residential Optimized Charging Pilot* – Customers with access to dedicated residential chargers are often able to charge their EVs over long periods of time. In ten hours of continuous charging, these customers can add approximately 200 miles of range with a Level 2 charger or 40 miles with a Level 1 charger, which may exceed the distance the vehicle travels on a typical day. Optimized charging allows customers to modify the level of charge they receive passively within a charging session to optimize the savings available through an hourly pricing rate. This would also improve the overall grid efficiency by shifting EV charging to hours in which lower cost resources are available to meet their needs. Implementing passive optimized charging requires a third-party platform to schedule and modify customer charging levels in response to real-time PJM Locational Marginal Prices ("LMPs") subject to customer-defined constraints such as the desired charge level and duration of a charging session. Understanding the technical components and customer behavior under a Residential Optimized Charging Pilot would provide valuable data and lessons that would inform a larger rollout of the concept.
- *Backup Power Capabilities* – some new electric vehicle models, such as the Ford F-150 Lightning, advertise the vehicle's ability to put power from the vehicle's battery back to the grid. School buses that provide V2G services, by definition, also have this capability. During outage periods, EVs with bidirectional capability could support customer resiliency, however the extent to which this is practicable is to this point unknown. A Backup Power Capabilities Pilot would study mobility requirements, bidirectional EV charging stations, and the performance of EVs as backup power sources.

The BE Pilot Program would not be limited to these concepts. Stakeholders will be encouraged to propose their own pilots, apply for pilot funding, and partner with ComEd to explore the capabilities of BE resources.

5. Portfolio

ComEd will incur some level of portfolio-level expense in order to implement this plan. Portfolio costs in the BE Plan include non-program specific, cross-cutting activities that support the overall BE Plan. This includes labor and contracting to support portfolio planning, and reporting and associated system development, legal services, financial, and customer support / experience activities (e.g., call center, escalations, customer satisfaction, customer journey activities). Unlike portfolio costs, program-specific administration costs are included in sub-program budgets.

ComEd projects annual portfolio costs that average to $8 million across the three-year BE plan to implement a plan of this magnitude and breadth. These costs could vary over time; for example, portfolio costs are likely to be higher in early years to stand up the BE Plan and identify, develop, and train program staff.

6. EV Charging Delivery Classes

In conjunction with this BE Plan, ComEd has submitted a tariff filing to the ICC that proposes to create two new EV Charging Delivery Classes for nonresidential customers that provide electric vehicle charging. Key features of the proposal include:

- Standard service for new customers electing an EV Charging Delivery Class will be defined to reasonably cover the cost of infrastructure on the utility side of the meter as well as between the customer meter and panel. Existing customers electing the Class will not be charged "utility side" CIAC costs or transformer rentals if it is a second point of service. If needed to measure the EV charging load separately, a second meter will be installed and charged through Rider ML. The make-ready costs will be recovered within the customer class and recovered over time, allowing charging providers to avoid high upfront costs for charger installation. Containing the make-ready costs in the new delivery class will prevent cross-subsidization from other customer classes, such as low-income and residential customers.
- Customers electing the class will be provided the option to have their delivery costs for EV charging load billed on a kW or kWh basis. A volumetric (i.e., kWh) option will tie electric costs more directly to charger usage, which may be attractive to charging stations that are underutilized and incur high demand charges for relatively low consumption under current kW-based rate design.

The EV Charging Delivery Classes will facilitate greater public EV charger availability by addressing the concerns raised by public charging providers. As recommended by ICC Staff, these rate classes will simplify supplemental line extension costs, allow charging providers to have a greater portion of their bill charged through volumetric rates, and limit upfront cost barriers for new charging stations.[60]

[60] BE Workshops Staff Report at 40, 41, 50, 60.

VI. Evaluation of ComEd's Beneficial Electrification Plan

The Electric Vehicle Act as amended by CEJA includes four core requirements for this BE Plan:[61]

- A Plan must address ten subjects set forth in 20 ILCS 627/45(d)(i-x).
- The Commission must consider eight criteria, set forth in 20 ILCS 627/45(d)(1-8), when determining whether a BE plan is in the public interest.
- 1% Rate Impact Cap for EV Infrastructure ("1% Rate Cap") [20 ILCS 627/45(g)] – requires that the "retail rate impact from the development of electric vehicle infrastructure shall not exceed 1% per year of the total annual revenue requirements of the utility."
- Benefit-to-Cost Analysis Test ("BCA Test" or "BCA") [20 ILCS 627/45(d)] – describes the manner in which the Plan shall be evaluated in order to determine whether the net benefits of the plan exceed the net costs.

The Plan's satisfaction of these four requirements is explained in more detail in this section. In addition, the Electric Vehicle Act as amended by CEJA requires that:

- Consideration of the Staff Workshop Report Recommendations [20 ILCS 627/45(d)] – requires that "[t]he plan shall take into consideration recommendations from the workshop report." ComEd greatly appreciates the insights provided throughout the Workshop process, which have helped shape this Plan. Considerations pertaining to stakeholder recommendations have been addressed and noted throughout this Plan.

- Workforce Equity [20 ILCS 627/45(h)] – requires that "the utility shall demonstrate efforts to increase the use of contractors and electric vehicle charging station installers that meet multiple workforce equity actions." ComEd Witness Melissa Washington addresses this in her testimony.

ComEd's BE Plan Addresses the Ten Subjects Set Forth in Section 45(d)(i)-(x)

The Electric Vehicle Act as amended by CEJA requires a BE Plan to address ten subjects, including the types of programs, incentives, and standards for ComEd to implement in its plan. This section explains how ComEd's BE Plan meets these requirements, with EVA text shown in bold.

The Beneficial Electrification Plan shall specifically address, at a minimum, the following:

i. Make-ready investments to facilitate the rapid deployment of charging equipment throughout the State, facilitate the electrification of public transit and other vehicle fleets in the light-duty, medium-duty, and heavy-duty sectors, and align with Agency-issued rebates for charging equipment

The Residential EV Charging Infrastructure Sub-program and C&I and Public Sector EJ/R3 Charging Infrastructure Sub-program provide rebates for make-ready infrastructure for residential and C&I customers. These rebates cover equipment installed by the customer between the meter and the charger, including the charger. The C&I and Public Sector EJ/R3 Charging Infrastructure Sub-program has rebates

[61] The titles shown here were developed for convenience. While they are not explicitly included in the legislation, they refer to specific text in the legislation.

set at different levels for L2 and DCFC chargers in recognition that entities like public transit agencies may have different charging needs than light duty fleets, for example.

ComEd's EV Charging Delivery Classes will allow costs of make-ready distribution investments in front of the customer meter to be fairly socialized and recovered, streamlining the process for public charging providers to expand to new locations and facilitating the rapid deployment of charging equipment.

The C&I and Public Sector EV Purchase Sub-program will additionally facilitate the electrification of public transit and other vehicle fleets in the light-duty, medium-duty, and heavy-duty sectors by providing EV purchase rebates tailored to each vehicle class that will spur EV adoption.

ii. The development and implementation of beneficial electrification programs, including time-of-use rates and their benefit for electric vehicle users and for all customers, optimized charging programs to achieve savings identified, and new contracts and compensation for services in those programs, through signals that allow electric vehicle charging to respond to local system conditions, manage critical peak periods, serve as a demand response or peak resource, and maximize renewable energy use and integration into the grid

ComEd's Residential EV Charging Infrastructure Sub-program is paired with participation in an hourly pricing rate to most fully implement a signal of the best time to charge an EV. Only a price signal that varies in concert with the grid conditions can fully signal local system conditions, critical peak periods, and times of potential renewable energy curtailment. Through this structure, participating residential customers will have a strong incentive to charge their EVs at hours that would be most beneficial to the grid and will capture associated savings.

The BE Pilot Program intends to consider optimized charging, new grid services, and real-time response to grid conditions. A School Bus V2G Pilot will examine the extent to which school buses can provide grid services. Among these services is providing energy to the grid during peak conditions (whether through registration as an energy storage capacity resource or a demand response provider). Since times of renewable energy curtailment are typically accompanied by low or negative Locational Marginal Prices (LMPs), the school bus will have an incentive to charge its battery during these hours and discharge the excess energy at times of higher electric demand. In addition, a Residential Optimized Charging Pilot will allow participants to respond automatically and passively to system conditions and price signals, enhancing charging savings and charging their vehicles at times of greatest benefit to the grid.

iii. Optional commercial tariffs utilizing alternatives to traditional demand-based rate structures to facilitate charging for light duty, heavy duty, and fleet electric vehicles

ComEd's EV Charging Delivery Classes offer an alternative to traditional demand-based rate structures for enrolled C&I customers. An EV Charging Delivery Class customer can choose between kW-based or kWh-based rates, providing an alternative for charging providers who prefer to have a greater portion of their electric bill composed of volumetric charges.

iv. Financial and other challenges to electric vehicle usage in low-income communities, and strategies for overcoming those challenges, particularly in communities and for people for whom car ownership is not an option

The "Challenges to Beneficial Electrification" section of this Plan provides a comprehensive overview of the barriers to electric vehicle usage in low-income communities, such as the upfront purchase cost of an EV and inadequate charging access. Several of ComEd's BE Plan sub-programs directly address these barriers.

Each of ComEd's Residential EV Purchase Sub-program, Residential EV Charging Infrastructure Sub-program, and C&I and Public Sector EV Purchase Sub-program provides an enhanced rebate for low-income customers and customers in Environmental Justice or R3 communities in recognition of the challenges to EV adoption and the importance of air quality improvements in these areas, leading to greater adoption and available charging infrastructure. Additionally, the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program is dedicated solely to EJ and R3 communities. The Customer Education and Awareness program will have specific, directed outreach to low-income customers and EJ and R3 communities to ensure that customers are aware of the incentives available to them.

People for whom car ownership is not an option will benefit from the BE Plan, not only from the air quality benefits but also through the increased adoption of transit buses. The C&I and Public Sector EV Purchase Sub-program dedicates $6 million for transit buses while the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program provides charging infrastructure rebates that can be used by transit operators for Level 2 or DCFC infrastructure.

v. Methods of minimizing ratepayer impacts and exempting or minimizing, to the extent possible, low-income ratepayers from the costs associated with facilitating the expansion of electric vehicle charging

As discussed in the following section titled "ComEd's BE Plan Complies with the 1% Rate Impact Cap for EV Infrastructure," the rate impacts of the BE Plan are relatively modest compared to the substantial benefits that the BE Plan provides. Costs of sub-programs dedicated to C&I customers will be collected within the C&I customer classes, ensuring that residential customers are not unduly burdened by program costs. Further, the proposed new EV Charging Delivery Classes will prevent residential customers from bearing the cost of make-ready improvements to ComEd's distribution system that are made in support of EV infrastructure for enrolled customers.

vi. Plans to increase access to Level 3 Public Electric Vehicle Charging Infrastructure to serve vehicles that need quicker charging times and vehicles of persons who have no other access to charging infrastructure, regardless of whether those projects participate in optimized charging programs

Through ComEd's C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program, Direct Current Fast Chargers (also known as "Level 3" chargers) are eligible for rebates of up to $1,000 per kW. Since these rebates are dedicated to infrastructure serving EJ or R3 communities, DCFC stations can serve

those for whom charging access is limited and available charging times are limited, to the extent that these are also residents of or visitors to EJ or R3 communities.

vii. Whether to establish charging standards for type of plugs eligible for investment or incentive programs, and if so, what standards

Given the nascent, evolving status of the EV ecosystem, ComEd does not believe it would be appropriate to set any standards or requirements that would influence customers' choices of EVs or EV charging infrastructure. While ComEd supports interoperability, accessibility, and ease of payment for all charging infrastructure that its customers will use, it is cognizant of the fact that this is the first BE Plan and it is situated in a developing ecosystem. ComEd is looking to provide maximum flexibility to enable robust participation in the BE Plan and accelerate EV adoption and EV infrastructure deployment in Northern Illinois. ComEd will continue to monitor and track trends in charging standards and revisit the issue in updates to its BE Plan.

viii. Opportunities for coordination and cohesion with electric vehicle and electric vehicle charging equipment incentives established by any agency, department, board, or commission of the State, any other unit of government in the State, any national programs, or any unit of the federal government

ComEd's existing EV Toolkit currently contains a Savings, Benefits, & Incentives portal which shares information on available federal and state incentives for EV purchase and EV charging infrastructure. ComEd's Digital Advising Tools, potentially including an expansion of the EV Toolkit, will consider incorporating a tool that also serves as clearinghouse of information on other available incentives for various vehicle types. A core principle of ComEd's education and awareness efforts is to ensure that customers are able to find as much information relevant to the purchase of an EV as possible in an accessible, easily understandable fashion.

ix. Ideas for the development of online tools, applications, and data sharing that provide essential information to those charging electric vehicles, and enable an automated charging response to price signals, emission signals, real-time renewable generation production, and other Commission-approved or customer-desired indicators of beneficial charging times

As more customers with EVs change to hourly pricing rates (such as the residential customers who receive a Residential EV Charging Infrastructure Sub-program rebate or those who learn about potential savings through hourly rates via ComEd's digital advising tools), the ecosystem of third-party providers of automated charging response technologies will grow to serve this potential market.

The BE Pilot Program will further target exploration of this space. A Residential Optimized Charging Pilot will allow participating customers to automatically moderate their charging level in response to real-time LMPs. By guiding EV charging away from times of high prices, participants will avoid using electricity at times of highest cost, which are hours in which less efficient (and likely higher-emitting) generation units are being utilized. Shifting charging towards lower-priced hours is likely to reduce

curtailments of renewable generation, as curtailment of renewable generation is highly correlated with low or negative LMPs.

x. Customer education, outreach, and incentive programs that increase awareness of the programs and the benefits of transportation electrification, including direct outreach to eligible communities

In order to achieve robust participation in ComEd's Residential Program, C&I and Public Sector Program, and BE Pilot Program, it is essential to ensure that customers are aware of the tools and programs available to them. For this reason, customer education efforts are a key component of ComEd's BE Plan. In addition to the valuable online resources available in ComEd's EV Toolkit, ComEd's Customer Education and Awareness Program will expand its digital advising tools, create online resources for fleet vehicles, provide fleet assessment support, provide marketing and outreach about the BE Plan programs, and utilize direct, targeted outreach to eligible communities.

ComEd's BE Plan Satisfies EVA's Eight Public Interest Criteria Set Forth in Section 45(d)(1)-(8)

The Electric Vehicle Act as amended by CEJA sets forth a list of eight criteria that the Commission must consider in deciding whether a BE plan is in the public interest. *See* 20 ILCS 627/45(d)(1)-(8). This section explains how ComEd's BE Plan satisfies these criteria. In this section, each criterion is paired with a description of the elements of ComEd's BE Plan that satisfy it, with EVA text shown in bold.

"When considering if the plan is in the public interest and determining appropriate levels of cost recovery for investments and expenditures related to programs proposed by an electric utility, the Commission shall consider whether the investments and other expenditures are designed and reasonably expected to:"

(1) Maximize total energy cost savings and rate reductions so that nonparticipants can benefit

ComEd's BE Plan includes several measures to encourage more cost-effective use of the electric grid. The Residential EV Charging Infrastructure Sub-program, which comes with a requirement to enroll in hourly pricing, and a Residential Optimized Charging Pilot, will provide a strong incentive to charge EVs during hours when energy prices are low. Doing so will prevent EVs from adding costs to the grid during hours of high prices or limited resource availability. Additionally, C&I customers who are already on hourly pricing, and who will benefit from C&I rebate sub-programs, will have a strong incentive to maximize total energy cost savings and rate reductions by timing their use of the electric grid in the most cost-effective manner.

A School Bus V2G Pilot will allow electric school buses to provide services to the grid that can reduce total system costs to the benefit of all customers. Buses providing V2G services will decide between providing some or all of the following services: peak capacity, ancillary services such as frequency regulation, or daily or intra-daily energy balancing through charging at times of low energy prices and demand coupled with discharging at times of high energy prices and demand. To the extent that V2G

services are provided from electric school buses that are adopted due to the Beneficial Electrification Rebate but are not enrolled in the School Bus V2G Pilot, these benefits will only be magnified.

Additionally, all ComEd customers – whether participating in the BE Plan or not – will benefit from the significant local air quality improvements, carbon emission reductions, and grid stability benefits that ComEd's BE Plan will provide. By implementing cost recovery within the rate class that each BE effort targets, the costs of initiatives serving commercial and industrial customers are not placed on any residential customers, particularly low-income residential customers.

(2) Address environmental justice interests by ensuring there are significant opportunities for residents and businesses in eligible communities to directly participate in and benefit from beneficial electrification programs

ComEd's BE Plan is designed to promote equity and environmental justice in each program. Each rebate offered in the Residential EV Purchase Sub-program, Residential EV Charging Infrastructure Sub-program, and C&I and Public Sector EV Purchase Sub-program includes an enhanced rebate level for some combination of low-income customers and those from EJ or R3 communities. These enhanced rebates recognize the importance of achieving the benefits of BE in low-income customers and those located in EJ or R3 communities and promoting equity, and they acknowledge that the barriers to BE adoption may be greater for those applicants. Further, the funding in the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program is dedicated solely for applications that benefit EJ or R3 communities. To make sure that residents and businesses in eligible communities are able to take advantage of these sub-programs and unlock their associated benefits, ComEd is dedicated to its Customer Education and Awareness Program, which includes targeted outreach. ComEd expects that many elements of its BE Pilot Program (in particular, an Air Quality Mapping Pilot) will also be directed specifically at eligible communities.

(3) Support at least a 40% investment of make-ready infrastructure incentives to facilitate the rapid deployment of charging equipment in or serving environmental justice, low-income, and eligible communities; however, nothing in this subsection is intended to require a specific amount of spending in a particular geographic area

Make-ready incentives for infrastructure that supports BE adoption are provided through four ComEd rebate sub-programs: the Residential EV Charging Infrastructure Sub-program ($5 million in annual funding), the Residential BE Infrastructure Readiness Sub-program ($1 million), the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program ($10 million), and the C&I BE Infrastructure Readiness Sub-program ($4 million). Of this $20 million of infrastructure funding in the plan, $10 million is dedicated solely to applicants residing in or primarily serving EJ or R3 communities through the C&I and Public Sector EJ/R3 Charging Infrastructure Sub-program, which alone would account for 50% of make-ready infrastructure incentives. Nothing prevents low-income applicants or those residing in EJ or R3 communities from receiving a portion of the remaining $10 million of infrastructure funding as well; in fact, the enhanced rebates for those applicants encourage it. As a result, ComEd anticipates robust

participation from EJ and R3 communities as well as low-income customers that will ensure the 40% investment criterion is met, and likely exceeded.

(4) Support at least a 5% investment target in electrifying medium-duty and heavy-duty school bus and diesel public transportation vehicles located in or serving environmental justice, low-income, and eligible communities in order to provide those communities and businesses with greater economic investment, transportation opportunities, and a cleaner environment so they can directly benefit from transportation electrification efforts; however, nothing in this subsection is intended to require a specific amount of spending in a particular geographic area

Of the $100 million of investment in ComEd's BE Plan, a substantial share is budgeted for medium-duty, heavy-duty, school bus, and public transportation bus incentives. $12 million is dedicated to providing purchase incentives for school buses and public transit buses in the C&I and Public Sector EV Purchase Sub-program. If this requirement is read to include non-bus medium-duty and heavy-duty vehicles, then the $12.5 million and $10 million, respectively, dedicated to these segments of the C&I and Public Sector EV Purchase Sub-program would be included as well. ComEd also anticipates that some of the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program's $10 million funding will be used by bus applications. Given the enhanced rebate incentives for applicants residing in or primarily serving EJ or R3 communities in the C&I and Public Sector EV Purchase Sub-program and the exclusive eligibility of applications serving EJ or R3 communities in the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program, ComEd expects this 5% investment target in low-income, EJ, and R3 communities (equivalent to $5 million) to be greatly exceeded.

(5) Stimulate innovation, competition, private investment, and increased consumer choices in electric vehicle charging equipment and networks

ComEd's BE Plan aims to expand the EV ecosystem, in turn creating business opportunities for providers of charging equipment and charging networks. The Residential EV Charging Infrastructure Sub-program and C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program will distribute rebates for Residential and C&I EV chargers, creating a large market for certified suppliers and encouraging new suppliers. The Residential EV Purchase Sub-program and C&I and Public Sector EV Purchase Sub-program will help put many different types of additional EVs on the road, not just personal light duty vehicles. These vehicles will have a wide range of use cases and charging needs, providing a wider market for charging equipment and network vendors and a range of business cases for these vendors to cater to. Increased levels of EV adoption across these many vehicle types will stimulate innovation, competition, private investment, and increased consumer choices to meet the demands of this burgeoning market segment.

(6) Contribute to the reduction of carbon emissions and meeting air quality standards, including improving air quality in eligible communities who disproportionately suffer from emissions from the medium-duty and heavy-duty transportation sector

Replacing street-level emissions of carbon and surface-level pollutants from gasoline and diesel combustion with the lower-emitting resource mix of Illinois's electric grid will provide meaningful air quality improvements, especially in eligible communities that disproportionately suffer from the impact of these emissions. The Residential EV Purchase Sub-program and C&I and Public Sector EV Purchase Sub-program are designed to accelerate the deployment of EVs and capture the emissions reduction benefits their adoption brings by replacing internal combustion engines with electric motors powered by electric generation resources. A significant portion of these EV purchase sub-programs' funds are dedicated to medium- and heavy-duty vehicle fleets ($22.5 million of $53 million, or 42%). Additionally, 23% of their funds are directed towards transit and school buses. The C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program will provide customers with greater charging options and put Level 2 and DCFC vehicle chargers closer within reach, spurring additional EV adoption and the associated benefits in EJ and R3 communities. In the aforementioned sub-programs, vehicles and infrastructure that will produce emissions benefits for low-income customers and those in EJ or R3 communities will receive enhanced incentives or dedicated funding.

The Customer Education and Awareness Program will inform potential adopters of the environmental and cost savings available with EVs. Furthermore, ComEd's BE Pilot Program will include an Air Quality Mapping Pilot in its initial areas of focus. This pilot will gather valuable data about the extent to which eligible communities are subjected to high levels of surface-level pollutants and the extent to which areas near medium-duty and heavy-duty transportation vehicles are negatively impacted. With this information, ComEd will be better able to identify the optimal mix of vehicle and charging incentives to address air quality issues as its Plan evolves in subsequent years.

(7) Support the efficient and cost-effective use of the electric grid in a manner that supports electric vehicle charging operations

Spurring EV adoption will, by definition, add electric demand to the grid, which provides an opportunity to promote charging in a way that is synchronized with the capabilities of the electric grid. ComEd's BE Plan includes several mechanisms to do this. Its BE Pilot Program will target a School Bus V2G Pilot which will allow school buses to provide services to the grid, getting compensated for the role they can play in managing system peak conditions, balancing supply and demand on a minute-to-minute basis through frequency regulation, and shifting generation from day to night through strategic charging and discharging in the energy market. The Residential EV Charging Infrastructure Sub-program will require customers to enroll in hourly pricing, which will send a direct price signal to indicate the costs to the grid of charging at a given time, encouraging efficient and cost-effective decisions on when to put flexible EV demand on the grid. A Residential Optimized Charging Pilot will go a step further, integrating innovative technology that will allow vehicles to automatically adapt to system conditions, charging in a fashion that saves customers money while also using the grid efficiently and cost-effectively. To the extent that any BE adopter has flexible charging needs, they too can save on their electric bills and help use the grid in an efficient manner by considering hourly pricing. ComEd's Customer Education and Awareness Program will

help provide the customer with the information they need to choose the appropriate rate tariff to match their EV charging needs.

(8) Provide resources to support private investment in charging equipment for uses in public and private charging applications, including residential, multi-family, fleet, transit, community, and corridor applications

ComEd's Residential EV Charging Infrastructure Sub-program and C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program are designed to support private investment in public and private charging. These sub-programs include a variety of charger types and applications – at-home residential charging, Level 2 charging, fast charging – and provide options for residential customers, multi-unit dwellings, fleet vehicles, transit, community, and corridor applications. Additionally, ComEd's Customer Education and Awareness Program will provide educational resources to understand and examine EV and charging options, including resources tailored to the unique challenges of fleet electrification such as Customer Fleet Electrification Assessment.

ComEd's BE Plan Complies with the 1% Rate Impact Cap for EV Infrastructure

The Electric Vehicle Act, as amended by CEJA, includes a provision that governs the allowable rate impact from portions of the utility's BE Plan:

> *The retail rate impact from the development of electric vehicle infrastructure shall not exceed 1% per year of the total annual revenue requirements of the utility.*[62]

Several components of ComEd's BE Plan qualify as programs that target "development of electric vehicle infrastructure" and are listed in Table VI-1. Programs that are not associated with the "development of electric vehicle infrastructure" include programs which provide vehicle purchase rebates, support non-EV measures, provide education, or institute pilots unrelated to EV infrastructure.

Table VI-1: Electric Vehicle Infrastructure Development Funding in ComEd's BE Plan

Sub-program	Annual Budget:
Residential EV Charging Infrastructure Sub-program	$5M
C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program	$10M
Total:	**$15M**

As discussed in the testimony of ComEd Witness Chad Newhouse, ComEd's "total annual revenue requirements" – that is, the sum of all its revenue requirements, including distribution, transmission, energy efficiency, DG Rebate, and supply components, among others – for 2022 are $4.7

[62] 20 ILCS 627/45(g).

billion. 1% of this figure is $47 million, which is also well above the estimated retail rate impact from the $15 million in annual spending from measures that target development of EV infrastructure.

To provide additional context, the potential rate impacts of the three-year ComEd BE Plan are estimated in Table VI-2. These impacts are modest compared to the total electricity bill. In order to unlock the $225 million of net present value benefits created by the three-year BE Plan (described in the following section), customers will face relatively small rate increases. BE Plan costs are projected to have a residential bill impact that starts at 11 cents per month in 2025, rising to a 21 cent monthly impact for the typical residential customer by 2027. For C&I customers, the 2025 estimated rate impact is 42 cents per megawatt-hour of consumption, rising to an 83 cent per megawatt-hour impact by 2027.

Table VI-2: Projected BE Plan Customer Cost Impacts

Customer Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Residential Customer Bill ($/month)	-	-	$0.11	$0.16	$0.21	$0.15	$0.14	$0.14	$0.13	$0.12
C&I Customer Bill ($/MWh)	-	-	$0.42	$0.63	$0.83	$0.59	$0.57	$0.55	$0.52	$0.49
Annual Rev Req ($M) [Res + C&I]	-	-	**$29**	**$43**	**$57**	**$41**	**$39**	**$37**	**$36**	**$34**

Relative to the considerable benefits the BE Plan would produce for all, and considering the many objectives of the EVA that the BE Plan satisfies, these customer bill impacts are modest.

ComEd's BE Plan is Cost-Beneficial

Structure of the Benefit-to-Cost Analysis

The Commission must determine whether a Beneficial Electrification Plan is cost-beneficial. Specifically, the Electric Vehicle Act, as amended by CEJA, states the following:

> *The plan shall be determined to be cost-beneficial if the total cost of beneficial electrification expenditures is less than the net present value of increased electricity costs (defined as marginal avoided energy, avoided capacity, and avoided transmission and distribution system costs) avoided by programs under the plan, the net present value of reductions in other customer energy costs, net revenue from all electric charging in the service territory, and the societal value of reduced carbon emissions and surface-level pollutants, particularly in environmental justice communities. The calculation of costs and benefits should be based on net impacts, including the impact on customer rates.*[63]

This statutory language prescribes a comparison of "the total cost of beneficial electrification expenditures" with identified benefits associated with the BE Plan. ComEd's interpretation of this Benefit-to-Cost Analysis Test is summarized in the following diagram and subsequently explained in further detail.

[63] 20 ILCS 627/45(d).

Table VI-3: BCA Test Structure

	Costs (Net Present Value)	<	Benefits (Net Present Value)						
Electric Vehicle Act Language on the "Cost-Beneficial" Determination	**Total cost of beneficial electrification expenditures**	**<**	**Increased electricity costs (defined as marginal avoided energy, avoided capacity, and avoided transmission and distribution system costs) avoided**	**+**	**Reductions in other customer energy costs**	**+**	**Net revenue from all electric charging in the service territory**	**+**	**Societal value of reduced carbon emissions and surface-level pollutants, particularly in environmental justice communities**
Itemized BCA Benefits and Costs in Alignment with the Electric Vehicle Act Language	Total cost of BE expenditures, whether incurred by adopters or funded by non-adopting customers: • Incremental purchase and maintenance costs of EV vs. ICE (similar comparison for non-transportation BE) • Incremental charger, installation, and make-ready costs • Increases in electricity costs (energy costs, capacity costs, and transmission and distribution costs, all approximated using retail rates) • Education and awareness costs • Administration costs • Pilots and technical demonstration costs	<	Avoided electricity costs (energy costs, capacity costs, and transmission and distribution costs, all approximated using retail rates) from shifting or eliminating current electricity usage	+	Avoided ICE fuel costs (or similarly avoided fossil fuel costs for non-transportation BE)	+	Net revenue from additional services provided (e.g., frequency regulation)	+	Value of reductions in carbon emissions + Value of reductions in surface-level pollutants

Regarding the costs to be included in the analysis, the statutory language states that the total cost of beneficial electrification expenditures should be considered. This definition is not limited to costs directly incurred by the utility or any other subset of costs. In fact, since the statutory language includes benefits that do not flow through the utility, such as "reductions in other customer energy costs" and "the societal value of reduced carbon emissions and surface-level pollutants," it is reasonable and internally consistent to include beneficial electrification costs that might not flow through the utility, such as the cost of an electric vehicle charger or the incremental purchase and maintenance costs of an electric vehicle versus a gasoline or diesel-powered vehicle, as part of "the total cost of beneficial electrification expenditures." It is also possible that some of these cost components will be negative. For example, there is an expected maintenance cost savings from an electric vehicle versus a comparable gasoline or diesel-powered vehicle, which, when incorporated into the total cost calculation, reduces the total cost estimate.

The total cost of beneficial electrification expenditures consists of the following cost components:

- Incremental purchase cost: For electric vehicle applications, this is the expected purchase price of the electric vehicle less the expected purchase price of a comparable internal combustion engine vehicle. For other electrification applications, this is the incremental purchase cost of the non-transportation electric technology relative to the comparable fossil-fuel-based technology.
- Incremental maintenance cost: For electric vehicle applications, this is the expected maintenance cost of the electric vehicle less the expected maintenance cost of a comparable internal combustion engine vehicle. For other electrification applications, this is the incremental maintenance cost of the non-transportation electric technology relative to the comparable fossil-fuel based technology.
- Incremental charger, installation, and make-ready costs: This includes costs at both the utility-side of the meter and the customer-side of the meter.
- Increases in electricity costs: This includes the incremental energy costs, capacity costs, and transmission and distribution costs, all based on retail rate estimates.
- Education and awareness costs: This includes the costs incurred to support the utility's education and awareness efforts that are covered through BE Plan funding.
- Administration costs: This includes ComEd's non-program-specific portfolio overhead costs, and program-specific implementation costs.
- Pilots and technical demonstration costs: This includes the portion of the BE Plan budget allocated for pilots and technical demonstration projects.

The statutory language also identifies several categories to be included on the benefits side of the cost-beneficial equation. These include:

- "Increased electricity costs (defined as marginal avoided energy, avoided capacity, and avoided transmission and distribution system costs) avoided by programs under the plan." This benefit category reflects the avoided energy, capacity, transmission, and distribution costs resulting from shifting or eliminating current electricity usage (e.g., a customer charging off-peak versus at times throughout the day). These benefits will be realized to the extent that BE Plan Programs shift or eliminate sources of electricity usage in a way that avoids higher electricity costs. In particular, the Residential EV Charging Infrastructure Sub-program is paired with participation in an hourly pricing rate, and the time-of-use price signals from adopting this rate are likely to result in the participant shifting its usage to off-peak periods, resulting in energy and capacity cost savings.

- "Reductions in other customer energy costs." This benefit category reflects the avoided cost of the fuel associated with the non-electric technology that is replaced by the respective electric technology. For electric vehicles, these benefits include avoiding the cost of gasoline or diesel for an internal combustion engine vehicle.
- "Net revenue from all electric charging in the service territory." This benefit category is captured as the net revenues from additional services provided through charging and discharging (or putting energy back onto the grid). These revenues reflect the societal value of these additional services. However, such revenues may be applicable only in certain circumstances. For example, an electric school bus may provide energy, capacity, or ancillary services when it is not being used to transport students.
- "The societal value of reduced carbon emissions and surface-level pollutants, particularly in environmental justice communities." This benefit category is captured as the benefit of reductions in carbon dioxide and other greenhouse gas equivalents (in aggregate, "carbon") and the benefit of reductions in surface-level pollutants. Values for this category are based on governmental source estimates of the emission rates of carbon and surface-level pollutants, and monetized values of harm resulting from those emissions.

For some specific Sub-programs, there is an especially large amount of uncertainty regarding the mix of technologies or uses of technologies that will be supported by the Sub-program. Accordingly, there is an especially large amount of uncertainty regarding the costs and benefits of these Sub-programs. As a result, we may not know the actual costs and benefits of these Sub-programs at this time. Such Sub-programs include the allocation for rebates other than heat pump rebates in the Residential BE Technology Adoption Sub-program ($1 million allocation per year), the Residential BE Infrastructure Readiness Sub-program ($1 million allocation per year), the C&I BE Technology Adoption Sub-program ($2 million allocation per year), the C&I BE Infrastructure Readiness Sub-program ($4 million allocation per year), and the C&I and Public Sector EJ/R3 EV Charging Infrastructure Sub-program ($10 million allocation per year). A very conservative approach was adopted to ensure these particular Sub-programs are not overvalued. Specifically, a cost was assigned to the Sub-program equal to the dollar amount allocated to the Sub-program, without assigning a benefit to the sub-program.

The BE Pilot Program was assigned a net value of zero (i.e., benefits equal to costs). While the specific configurations of the pilots and technical demonstrations under this program are not known at this time, the main purpose of pilot and technical demonstration projects is to gain learning benefits that are not well suited to quantification but that justify such projects.

ComEd's BE Plan Passes the Benefit-to-Cost Analysis Test

The BE Plan is cost-beneficial. The total cost of beneficial electrification expenditures is less than the net present value of the associated benefits. The total net benefit of the BE Plan is $225 million dollars on a net present value basis, and the following table provides a breakdown of the cost and benefit categories modeled in the BE Plan BCA.

Table VI-4: Summary BCA Test Results (Three-Year BE Plan)

		BCA Element	Net Present Value of Benefit or (Cost) $ million
Costs	Total cost of beneficial electrification expenditures	Incremental Purchase Cost	166
		Incremental Maintenance Cost	(120)
		Incremental Charger, Installation, and Make-Ready Costs	123
		Increases in Electric Energy and Capacity Costs	47
		Increases in Electric T&D Costs	72
		Education and Awareness Costs	26
		Admin. Costs & Other Program Spending	102
		Pilots and Technical Demonstration Costs	Assumed Net Zero
	Total	***Total Costs***	**416**
Benefits	Avoided increased electricity costs	Avoided Energy and Capacity Costs from Shifting Electricity Consumption to Off-Peak Periods	3
	Reductions in other customer energy costs	Avoided Fuel Costs of the Replaced Non-Electric Technology	503
	Net revenue from electric charging	Net Revenue from Additional Services Provided through Charging	6
	Societal value of reduced carbon emissions and surface-level pollutants	Net Avoided Emissions of Carbon Dioxide and Other Greenhouse Gases	58
		Net Avoided Emissions of Surface-Level Pollutants	71
	Total	***Total Benefits***	**641**
Net	**Total**	**Net Benefit / (Cost)**	**225**

VII. Conclusion

In this BE Plan, ComEd proposes a $100 million annual investment over the next three years to help remove barriers related to upfront costs of electric vehicles and equipment; enable broad, equitable deployment of charging infrastructure; provide customer education and support; and ensure that investments are prioritized equitably and for communities of need. Through a mix of incentives, new rate design, and educational and technical support, the BE plan will spur beneficial electrification in Illinois and help support the state's goal of putting one million electric vehicles on the road by 2030.

Equity is a major focus throughout this BE Plan. BE measures that address air quality issues in Environmental Justice and R3 areas – such as the electrification of medium-duty fleet vehicles, heavy-duty fleets, and buses – have been prioritized to deliver relief to those who suffer disproportionately from fossil fuel emissions. Enhanced incentive levels, rebate sub-programs made exclusively available to low-income, EJ, or R3 applicants, and low-income, EJ, or R3 sub-program investment targets are designed to provide meaningful opportunities for these applicants to participate in the BE programs.

The BE Plan includes programs for all customer types, and the significant environmental and air quality benefits of these programs will accrue to all customers. The measures adopted through this five-year plan are estimated to produce environmental, air quality, avoided fuel and maintenance, and other net benefits to society valued at $225 million. ComEd is proposing a cost recovery plan that aligns benefits with costs, avoids large rate impacts, and ensures that an undue burden does not fall on low-income customers to support these initiatives. The average residential bill is expected to increase over time to $0.21 per month and the average commercial bill is expected to increase to $0.83 per megawatt-hour.

ComEd is committed to supporting a clean energy future that will drive equitable investment, advance the goals of the state's new clean energy law, and promote cleaner and safer communities for the future. The threat of climate change requires us to take swift action to reduce emissions by accelerating the adoption of cleaner technologies. Designed with input from hundreds of stakeholders, this proposed plan will help reduce barriers for customers and support broad adoption of electrification across homes, schools, and communities in our region – keeping the state of Illinois at the forefront of clean energy.