2023	8482
2024	400

SPONSOR:
Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFP01-01

QUESTION:

Refer to RFI EDF 1-2 and direct testimony of Rina Harris (page 10, lines 15-18) ("As the charging infrastructure continues to grow and, in some cases, begins to cluster in certain areas, the Company may begin to realize grid constraints that make it costly to upgrade service to the customers."). Please provide any studies, analyses, or other relevant documents (internal or external) that identify:

a. Where such clustering may occur;
b. The magnitude of such clustering (as measured by, as available, MW of load, number of customers, and number of vehicles);
c. The timing when such clustering may occur;
d. Any other relevant findings related to electric load growth related to EV clustering.

ANSWER:

a. See document 'Eroadmap Tool Screenshot.pdf' for visual representation of CenterPoint Houston Service Territory with Electric Power Research Institute's (EPRI) 'Gridfast' electrification projection overlay. This tool illustrates 'clustering' of proposed Megawatt Hour usage rate.
b. See document 'Eroadmap Tool Screenshot.pdf' which illustrates the load density referenced in Megawatt Hour
c. See document 'Eroadmap Tool Screenshot.pdf' which illustrates time lapsed MHDV Megawatt Hour projected growth between 2024 and 2030.
d. For excerpts from commissioned study by West Monroe, see document 'CNP_EV_whitepaper WM_edit.PDF'

SPONSOR:
Rina Harris

RESPONSIVE DOCUMENTS:
EDF RFP 01-01: Eroadmap Tool Screenshot.pdf
EDF RFP 01-01: CNP_EV_whitepaper WM_edit.pdf

TRANSPORTATION ELECTRIFICATION

Executive Overview White Paper

CenterPoint Energy eMobility

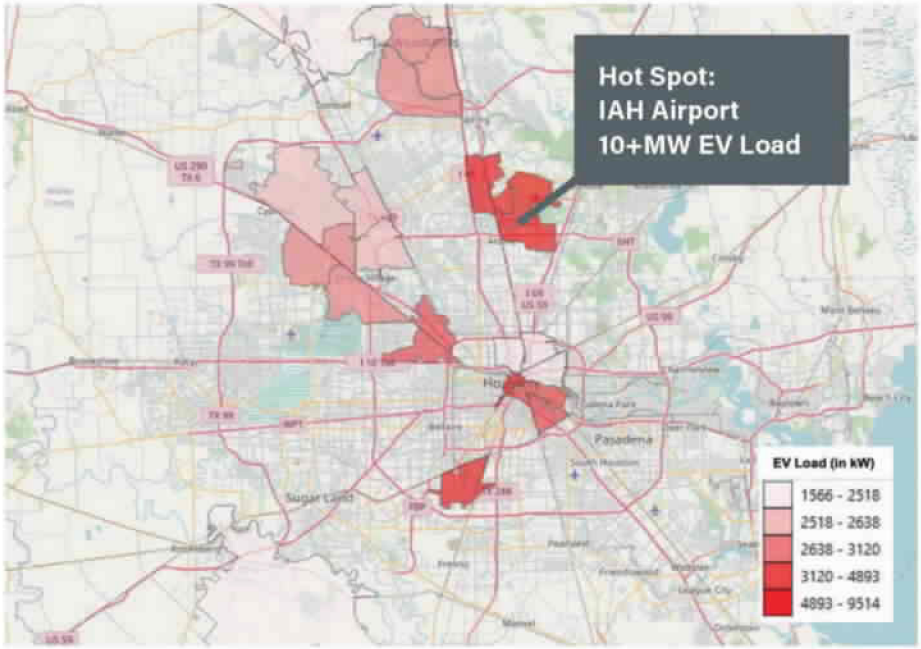
CenterPoint Energy

October 2022

Table of Contents

The purpose of this White Paper is to define the key elements of Transportation Electrification and outline the drivers of this growth opportunity for CenterPoint Energy, how this market development can affect the organization from load growth to resiliency challenges, as well as be a guide to leaders of all departments to formulate adaptive strategies.

EV LOAD HOT SPOTS BY ZIP CODE



The growth of EV load, and associated hot spots as show in the diagram above[5], brings with it escalating new service requests for electric vehicle chargers from residential, commercial, industrial and public sector customers, who will utilize one of the three categories of chargers shown at the right.

These EV charger service requests will drive capital spending requirements at the point of service and across the grid network, in some cases doubling capacity demand on circuits.

KEY FINDING

High adoption EV circuits in CNP's Houston service territory may experience more than a doubling of load from EV growth

EV charger types & power levels

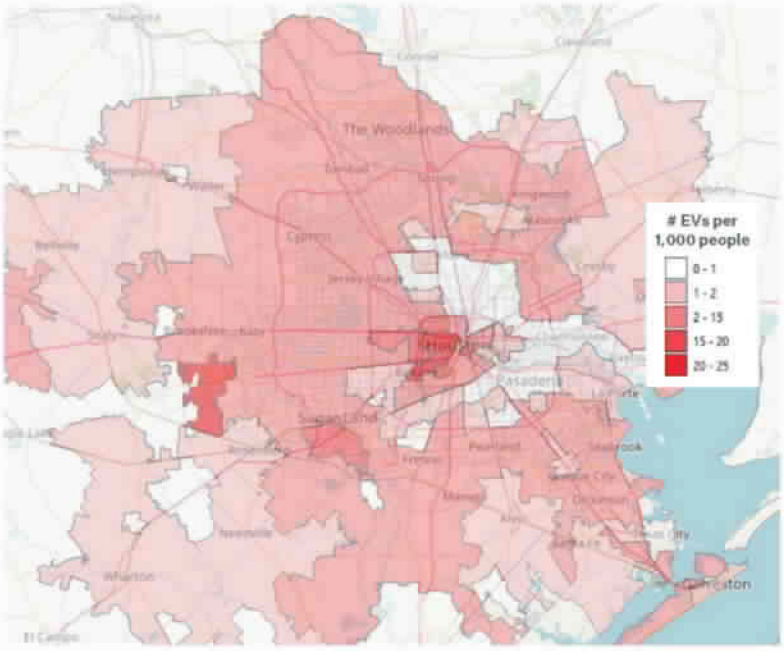
Level 2
10 – 19 kW

DC Fast Charger
50 – 250 kW

Ultra Fast Charger
350+ kW

5 Source: West Monroe

EV LOAD HOT SPOTS BY ZIP CODE



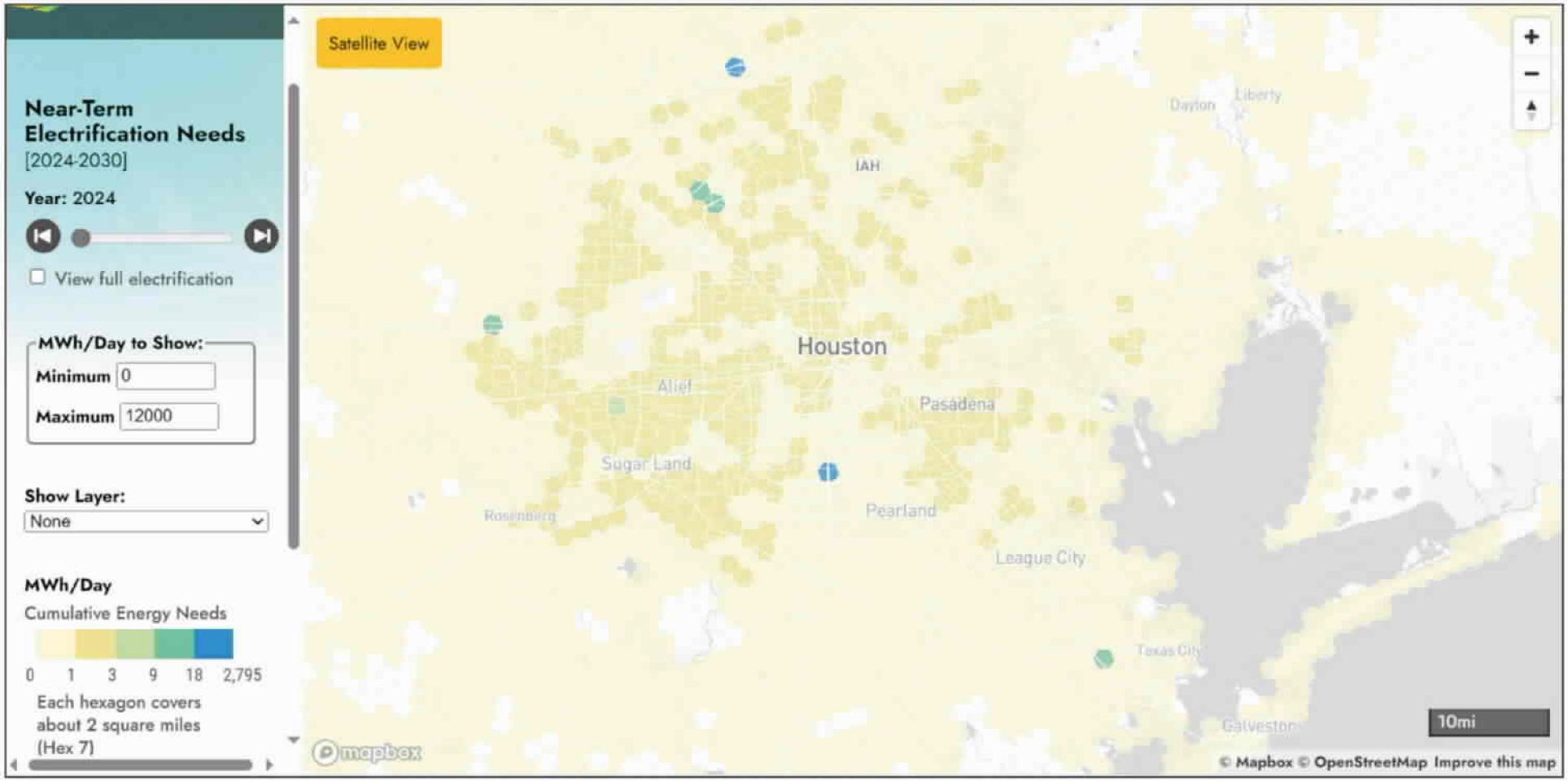
EXISTING / PLANNED CHARGER LOCATIONS IN CNP'S HOUSTON TERRITORY[7]

Despite the expectation of significant growth of transportation electrification in the Greater Houston area, there remains significant barriers to EV adoption across all customer segments. With the projected growth of the EV market and the robust goals set by community organizations like Evolve Houston, it is paramount to identify and explore the barriers to EV adoption.

CenterPoint's recent Transportation Electrification Study found that 50% of residential EVs are concentrated in 20% of Houston zip codes today, a trend that is expected to continue under current market conditions. Equitable access to the benefits of electric transportation will only be achieved once all of the factors on page 19 are addressed. And because some of these accessibility issues are only loosely within CNP's control, the importance of community partners participation is paramount.

Barriers to Transportation Electrification present opportunities for CenterPoint through its partnerships to improve access to electrified transport in their preferred mode of transportation.

Year 2024


Near-Term Electrification Needs
[2024-2030]
Year: 2024
View full electrification
MWh/Day to Show:
Minimum 0
Maximum 12000
Show Layer:
None
MWh/Day
Cumulative Energy Needs
0 1 3 9 18 2,795
Each hexagon covers about 2 square miles (Hex 7)
Satellite View
Houston
IAH
Dayton
Liberty
Alief
Pasadena
Sugar Land
Pearland
League City
Rosenberg
Texas City
Galveston
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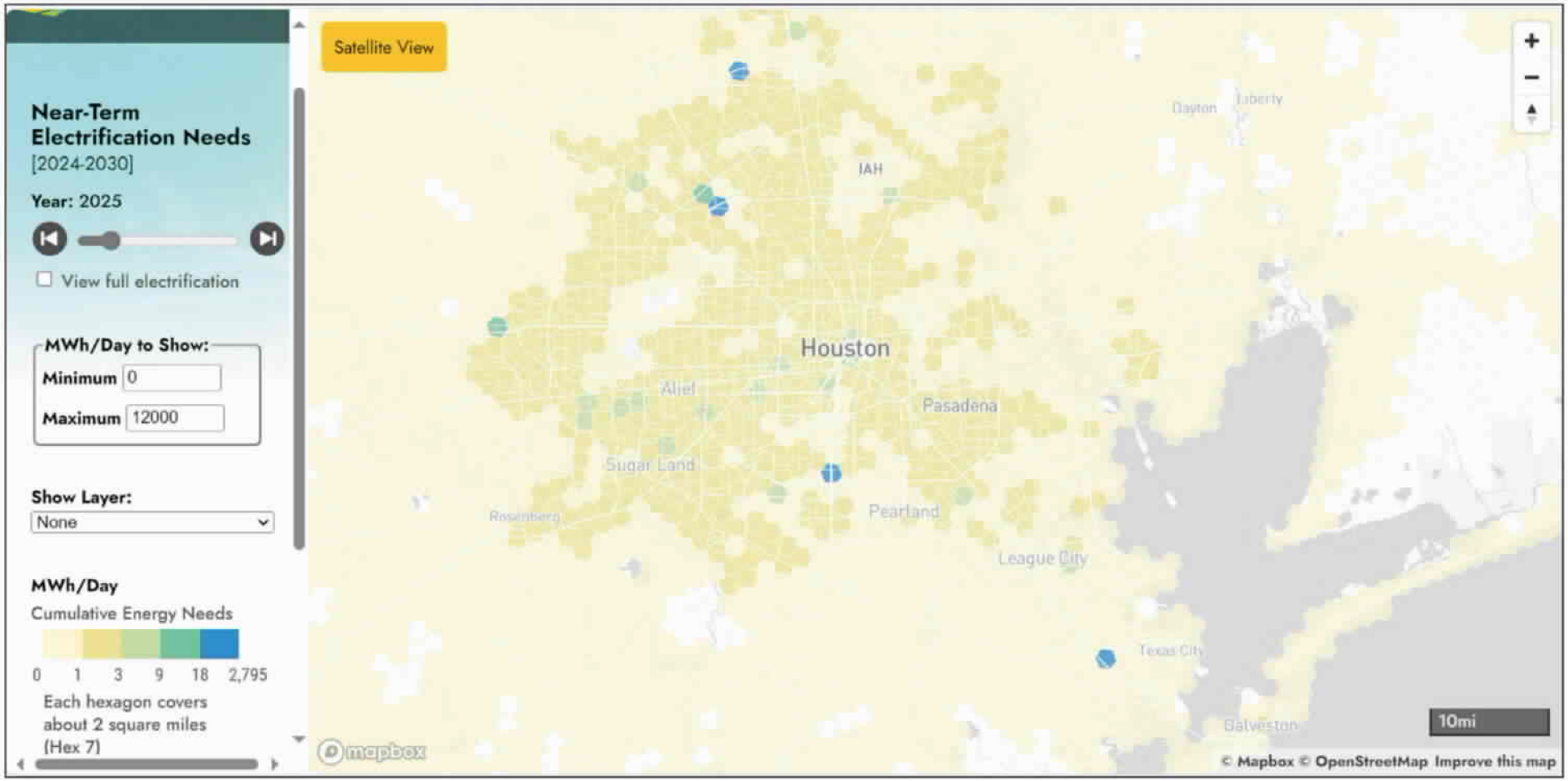
mapbox
© Mapbox © OpenStreetMap Improve this map

Year 2025


Near-Term Electrification Needs
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Year: 2025
View full electrification
MWh/Day to Show:
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None
MWh/Day
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Rosenberg
League City
Texas City
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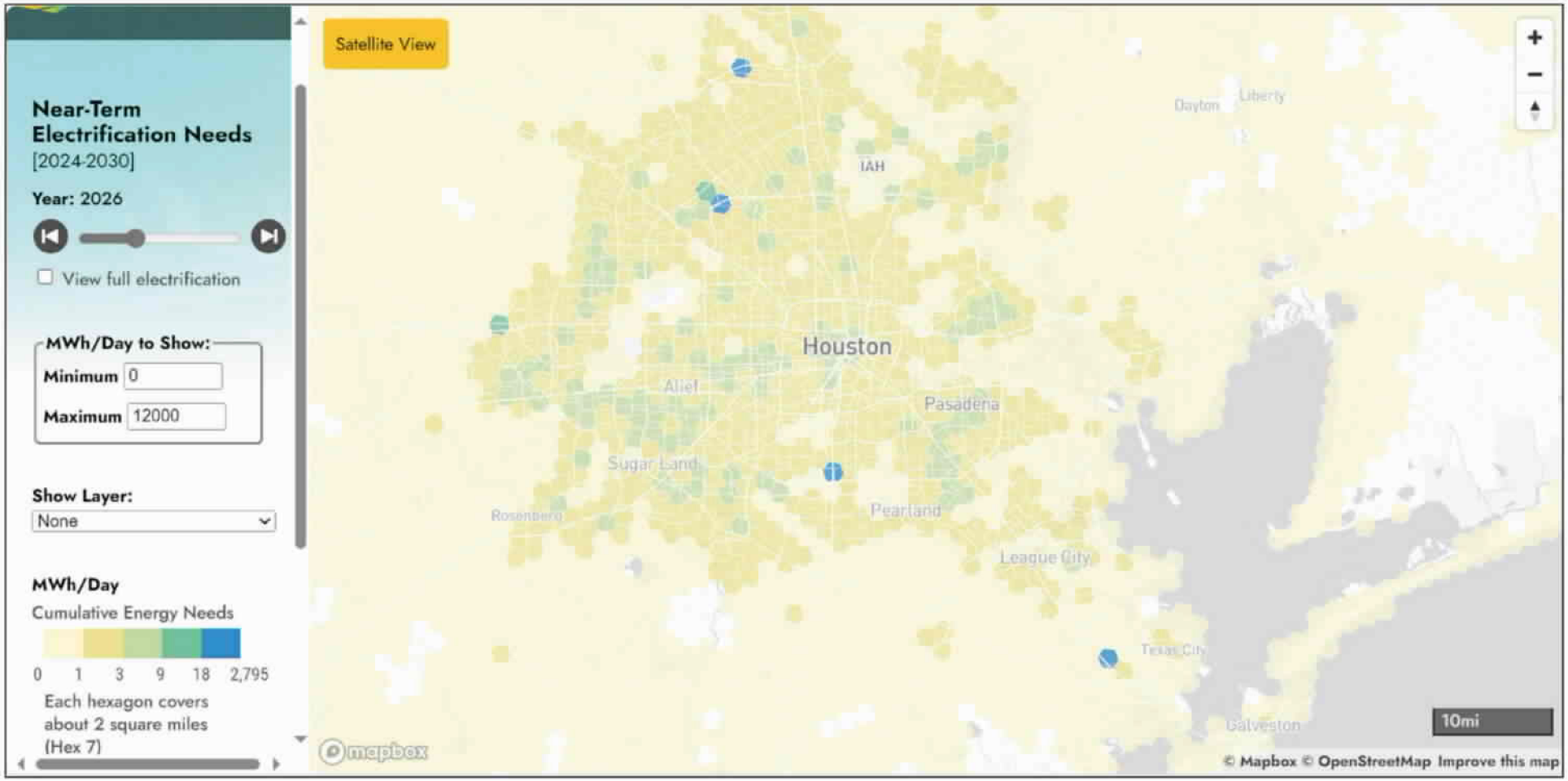
Year 2026


Near-Term Electrification Needs
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Year: 2026
View full electrification
MWh/Day to Show:
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Maximum 12000
Show Layer:
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Cumulative Energy Needs
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Each hexagon covers about 2 square miles (Hex 7)
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Houston
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Dayton
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Texas City
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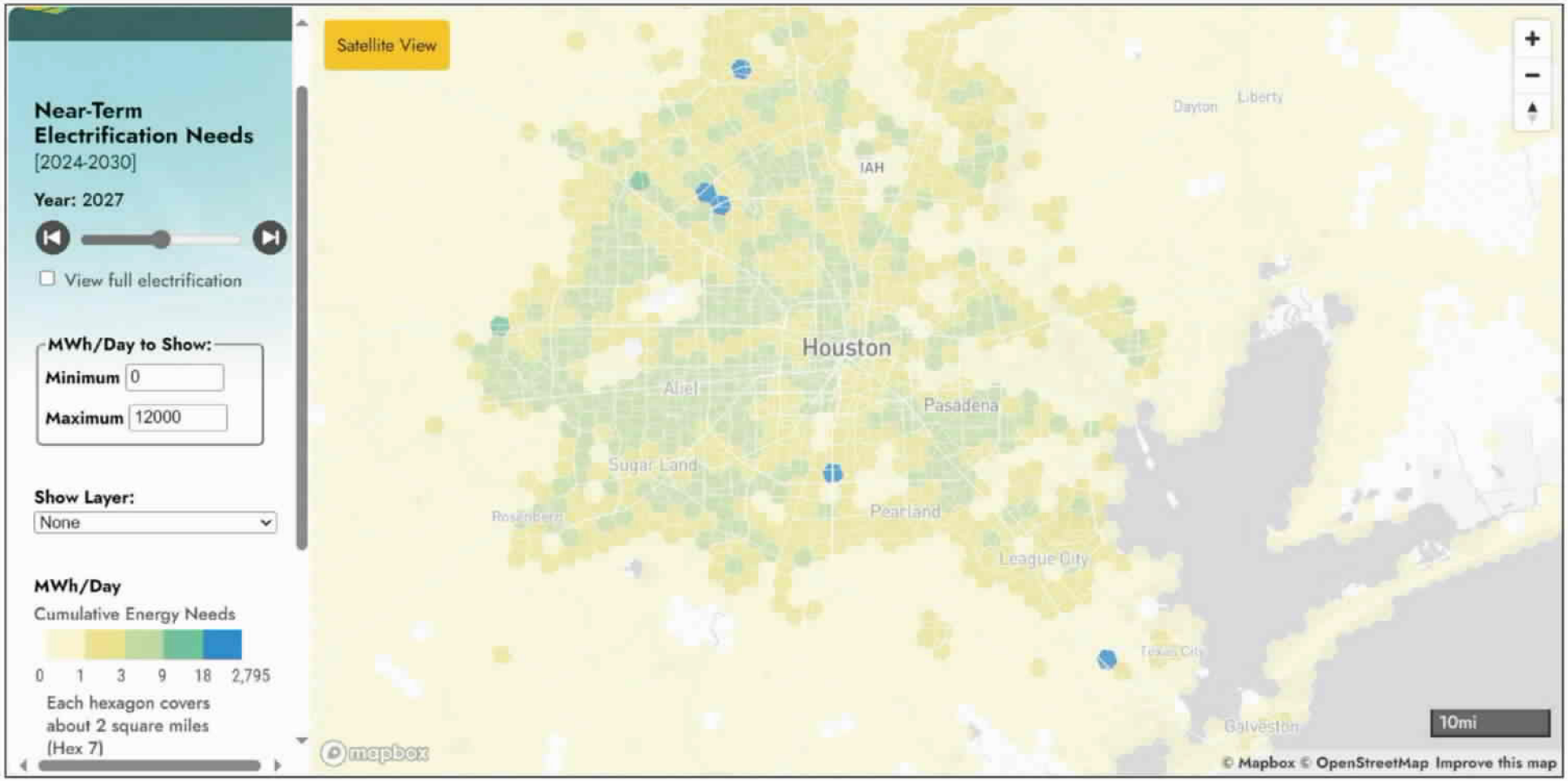
Year 2027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MWh/Day to Show:
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Maximum 12000
Show Layer:
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MWh/Day
Cumulative Energy Needs
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Satellite View
Houston
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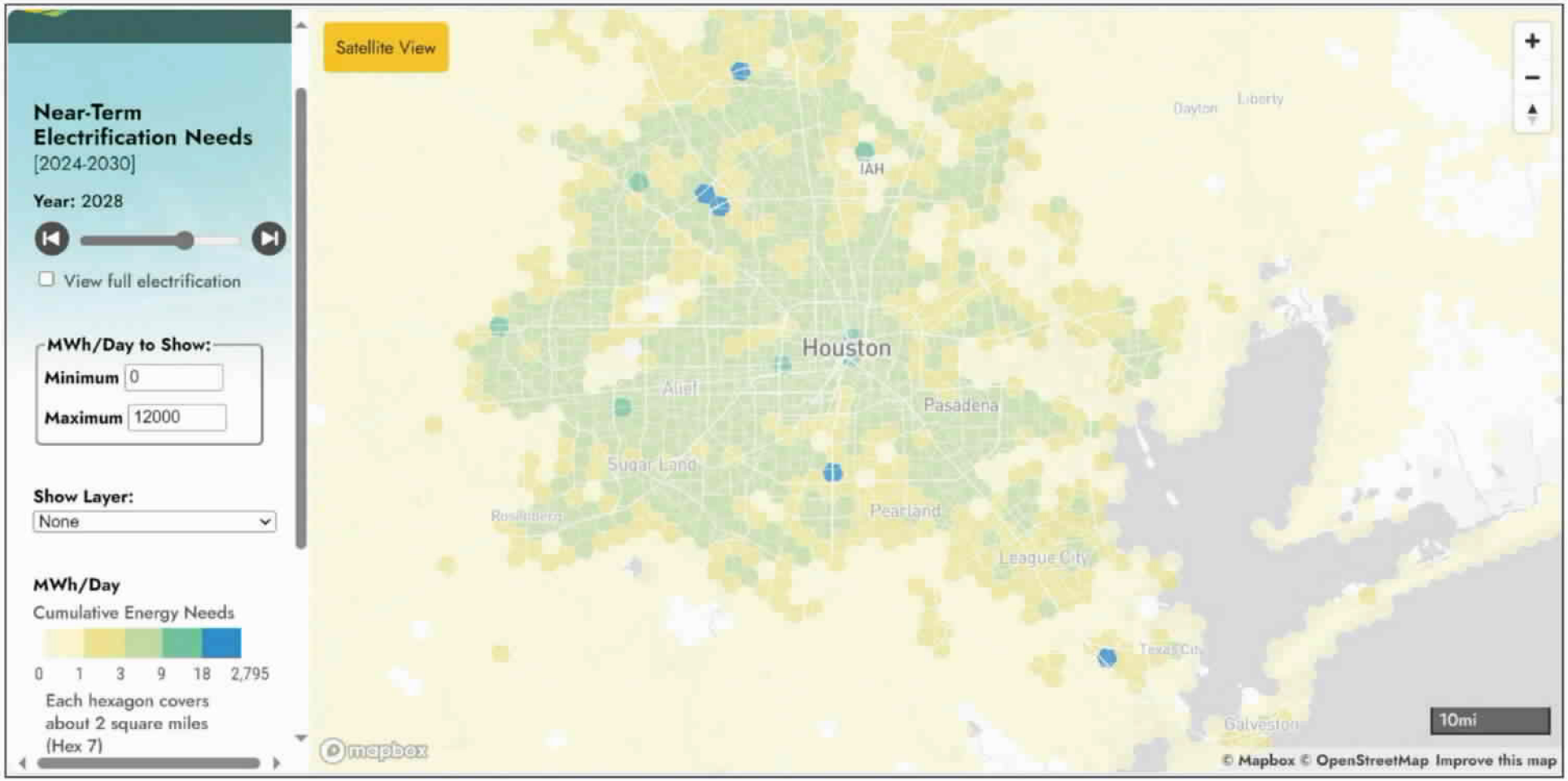
Year 2028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Maximum 12000
Show Layer:
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Each hexagon covers about 2 square miles (Hex 7)
Satellite View
Houston
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League City
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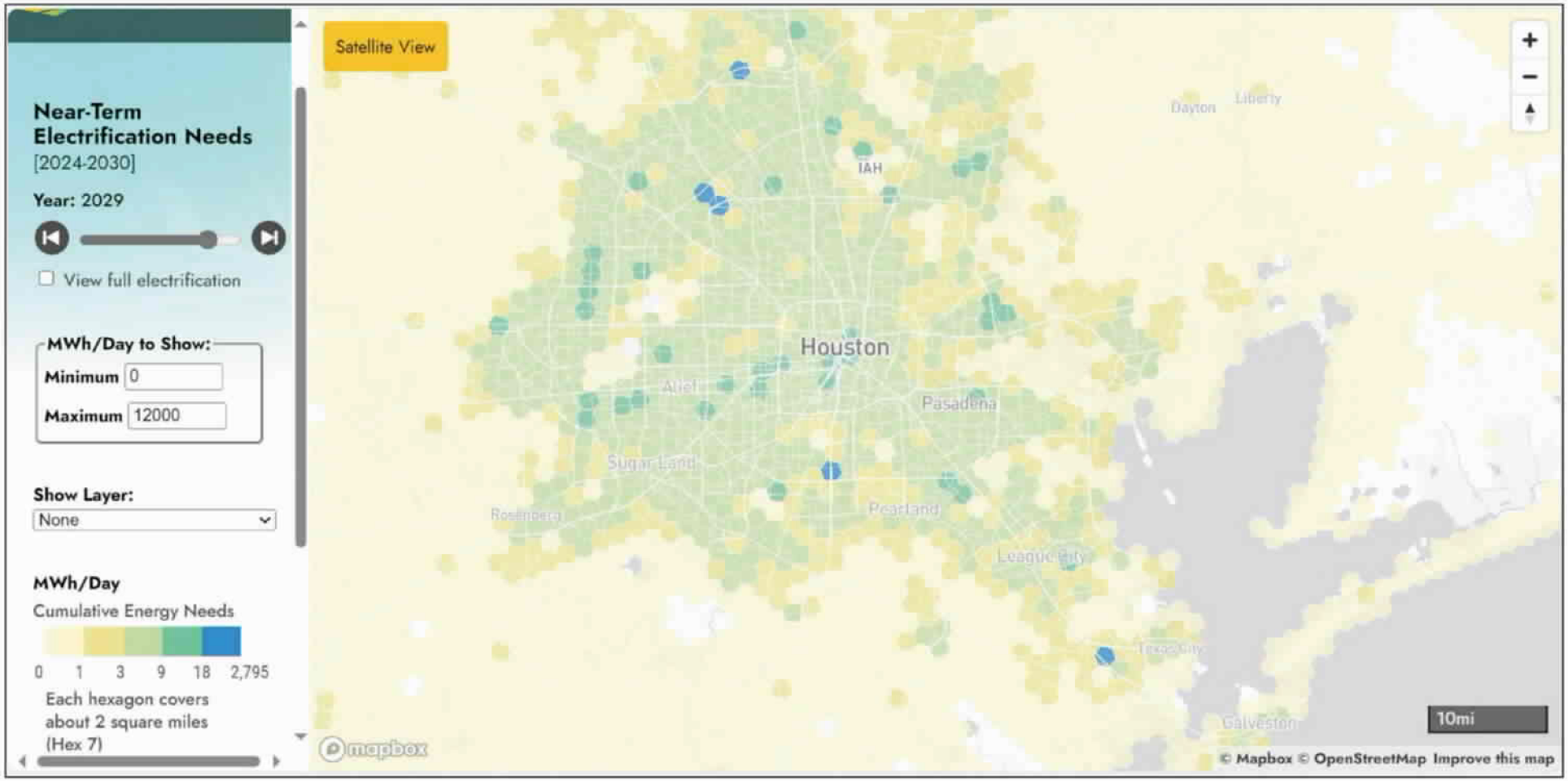
Year 2029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Minimum 0
Maximum 12000
Show Layer:
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MWh/Day
Cumulative Energy Needs
0 1 3 9 18 2,795
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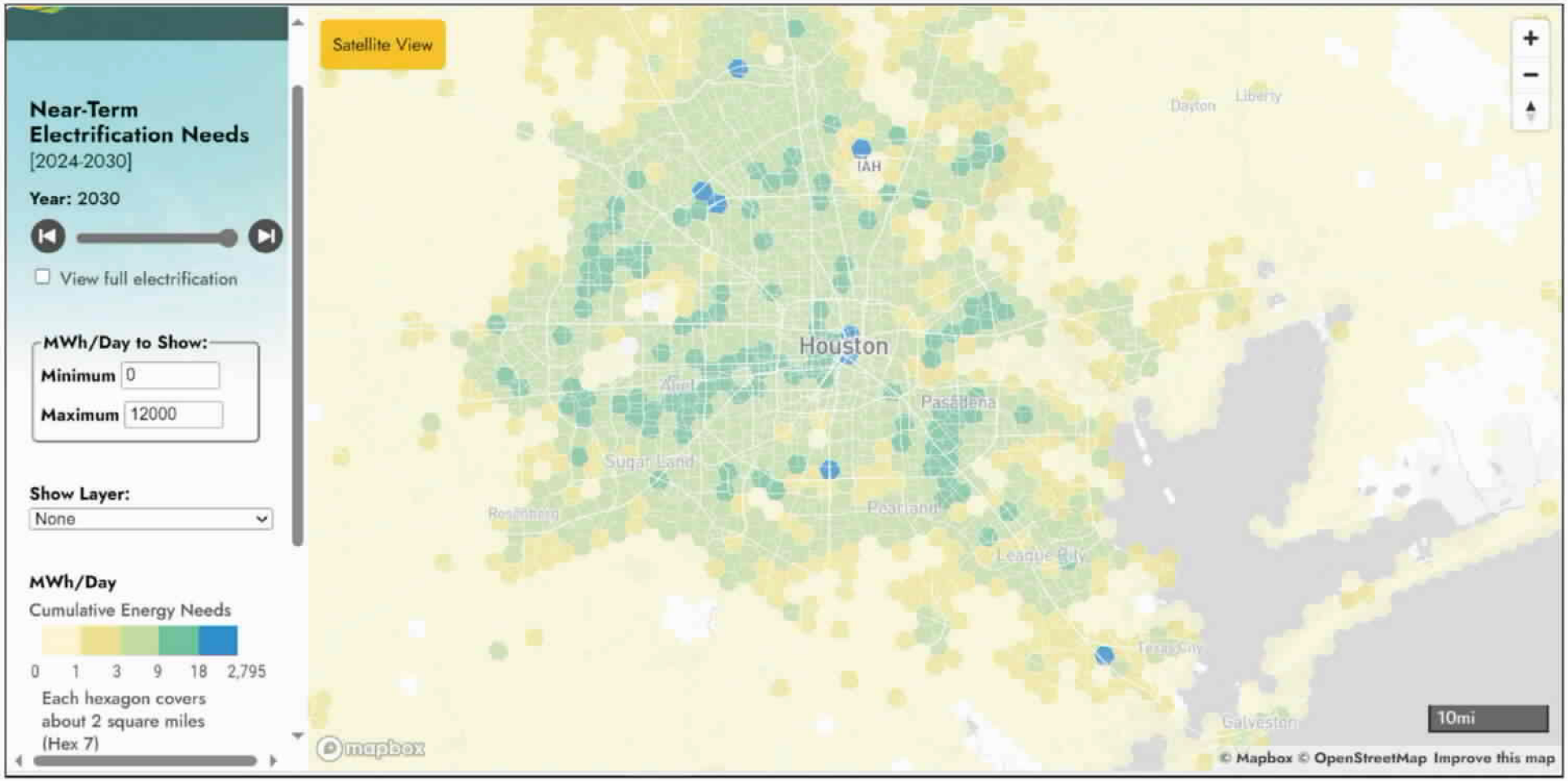
Satellite View
Houston
IAH
Dayton
Liberty
Pasadena
Sugar Land
Pearland
Galveston
10mi
© Mapbox © OpenStreetMap Improve this map

Year 2030


Near-Term Electrification Needs
[2024-2030]
Year: 2030
View full electrification
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Minimum 0
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Show Layer:
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Each hexagon covers about 2 square miles (Hex 7)
Satellite View
Houston
IAH
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Pasadena
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10mi
mapbox
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CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-01

QUESTION:

Refer to CenterPoint's Response to EDF RFI 1-1: " . . . CenterPoint Energy has invested in research studies and web based tools to anticipate EV conversion." Please explain how these studies inform CenterPoint's:

a. Load forecasting;
b. Distribution planning and/or distribution infrastructure deployment efforts.

ANSWER:

a. Currently, EV impact on load forecasting is determined based on new service requests submitted by customers. In the future, CenterPoint Energy plans to leverage findings from research studies and web-based tools to estimate future EV growth. The Company is continuing to evaluate how this data will be used in load forecasting.
b. See response to a. The Company is evaluating how future trends of EV loads can be leveraged to improve distribution planning and/or distribution infrastructure deployment efforts.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-02

QUESTION:

Refer to CenterPoint's Response to EDF RFP01-01(a)-(c), at Bates pages 161-167 (depicting EPRI eRoadMAP tool screenshots). Please explain and provide any relevant documents as to how CenterPoint incorporates EPRI EV load projections into its:

a. Load forecasting;
b. Distribution planning and/or distribution infrastructure deployment efforts.

ANSWER:

a. Currently, load forecasting does not leverage EPRI EV load projections. The use of this data for future load forecasts and distribution planning is being evaluated.
b. See response to a.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-03

QUESTION:

Refer to CenterPoint's Response to EDF RFI 1-2: "The Company is also working to leverage forecasts for the studies . . . to determine areas that create potential constraints and implement proactive measures." Please explain what is meant by "proactive measures," including illustrative example(s) CenterPoint has implemented.

ANSWER:

The Company has not currently implemented any proactive measures driven by findings from any EV forecasts or studies. Efforts are underway to determine how this data could be leveraged. One example is to identify potential areas where distribution transformer or underground cable overloading due to EV charging could occur based on projected EV growth. This may provide insights on how long-term asset planning in terms of anticipated transformer or cable upgrades should be managed.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-04

QUESTION:

Refer to CenterPoint's Response to EDF RFI 1-5: "Currently, for the purpose of estimating EV load growth in the Distribution Development Plan, electrification impacts from EVs are only considered for commercial EV loads that have been submitted by customers as service additions or service expansions." Please reconcile this response with CenterPoint's Response to EDF RFI 1-2: "The Company is also working to leverage forecasts for the studies . . . to determine areas that create potential constraints and implement proactive measures."

ANSWER:

In the current process for selecting substations for distribution development plans and determining future substation loads to be studied in the distribution development plans, only new loads submitted as part of new service requests or service expansions are considered. The EV forecast and research study efforts mentioned in prior responses were undertaken to understand potential future impacts from EV penetration. After completion of these studies, the results will be evaluated to see how future load forecast and distribution development plan procedures may need to be modified.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFP02-01

QUESTION:

Refer to CenterPoint's Response to EDF RFP01-01(d). Please provide the complete study excerpted in this response.

ANSWER:

See document 'EDF-RFP02-01 CNP_EV_whitepaper WM.pdf'

SPONSOR:
Rina Harris / Eric Easton

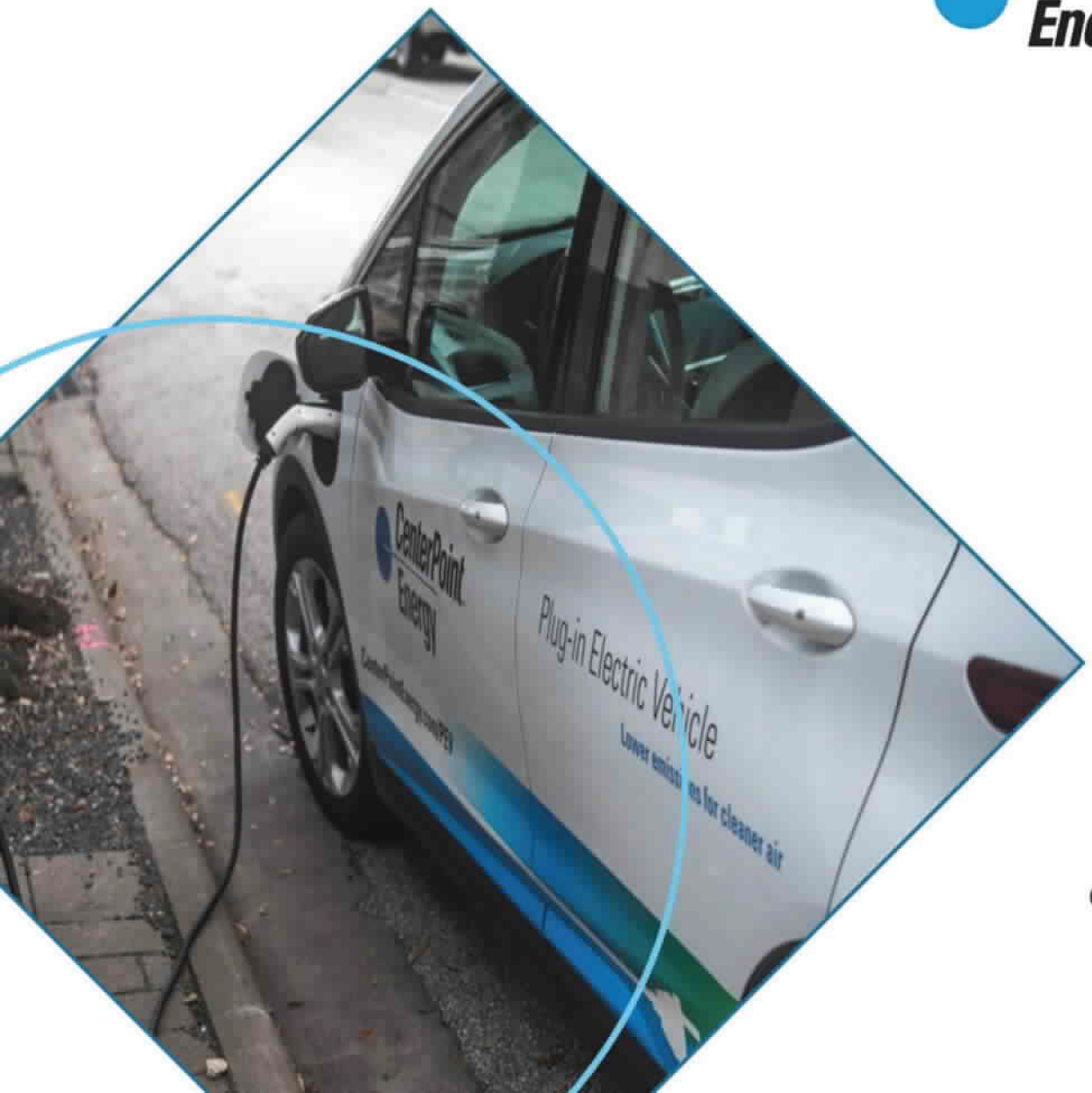
RESPONSIVE DOCUMENTS:
EDF-RFP02-01 CNP_EV_whitepaper WM.pdf

TRANSPORTATION ELECTRIFICATION

Executive Overview White Paper

CenterPoint Energy eMobility

CenterPoint. Energy

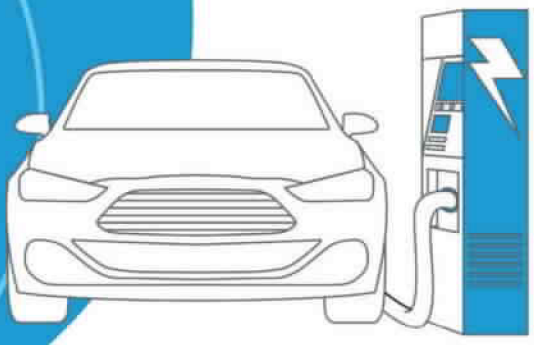


October 2022

Table of Contents

The purpose of this White Paper is to define the key elements of Transportation Electrification and outline the drivers of this growth opportunity for CenterPoint Energy, how this market development can affect the organization from load growth to resiliency challenges, as well as be a guide to leaders of all departments to formulate adaptive strategies.

1



TRANSPORTATION ELECTRIFICATION AND CENTERPOINT ENERGY

CenterPoint Energy (CNP) has completed a detailed study of Transportation Electrification (TE) in the company's Houston service territory that presents significant opportunities for economic growth as well as delivery of key benefits to customers. Numerous factors indicate that an inflection point has been reached in Transportation Electrification. The impact of this suggests the beginning of an era where CNP significantly enhances the existing electric delivery system and considers new services as it prepares to become a primary fuel provider for customer's vehicles.

Delivering electricity as transport fuel is a natural evolution in the services offered by electric utilities. Residential, commercial, and industrial customers are beginning to look to CNP to provide the electric power for sedans, pickups, vans, semi-trailer trucks, school and transit buses, off-road vehicles and aircraft. This presents tremendous opportunity for growth for electric utilities like CNP. However, **there are an array of actions needed to fully take advantage of this new market development.** Transportation Electrification also creates a powerful opportunity to meet the needs of the communities served, enable dramatic improvements in air quality, and support regional economic growth. This opportunity also positions CenterPoint to be a leader in energy innovation and present a proactive stance to large clients as they assess locations to expand

Transportation Electrification could be one of the largest margin growth opportunities for CNP in decades

Examples of actions needed:

- **Prepare grid for high levels of EV charging**
- **Engage customers**
- **Educate staff across departments**
- **Collaborate with partners**
- **Enhance regulatory positions**

Growth indicators: Potential Growth Forecast (in 2032, at ~10% EV adoption)[1]

~1.2 GW peak load increase

~5 TWh/ year energy sales increase

business operations. The potential for significant economic growth should cement Transportation Electrification as a strategic priority for CenterPoint Energy for the foreseeable future.

Transportation Electrification Market Forecast

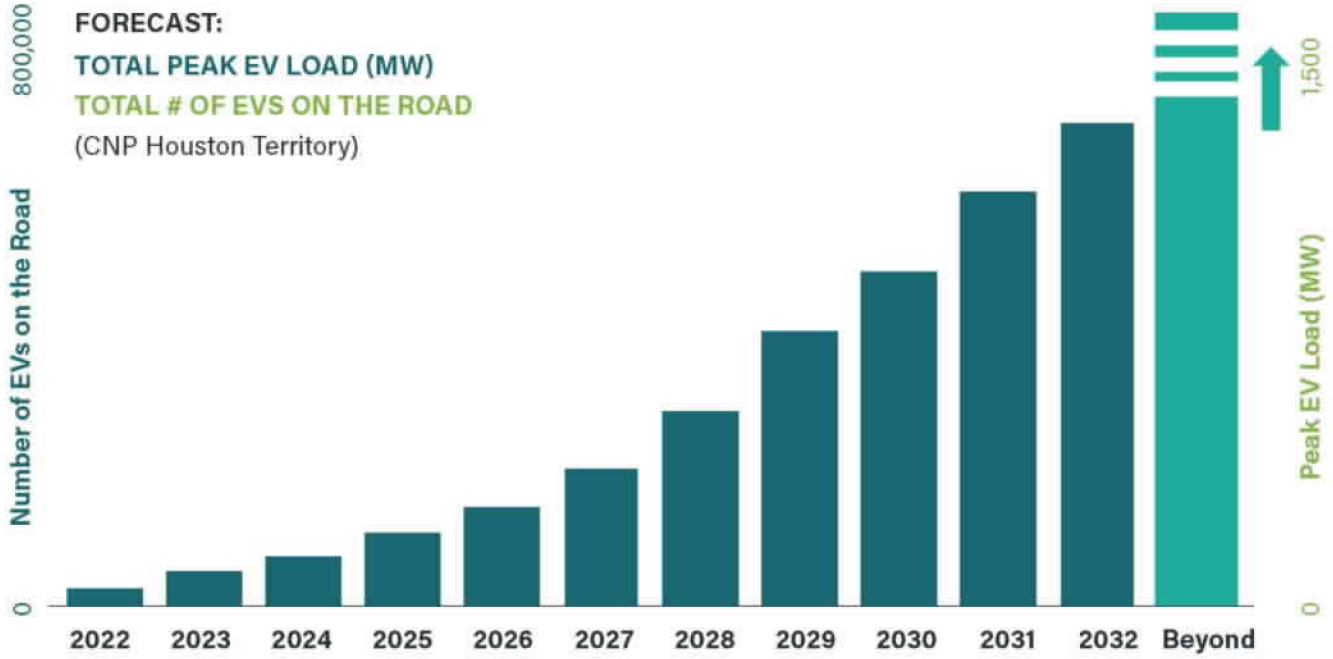
Forecasts by numerous analysts show the transportation sector is shifting steadily from gas and diesel fuel to electricity as transport fuel over the next few decades[2]. Evolve Houston, a local EV advocacy group with a board consisting of CNP, the Houston

EVOLVE HOUSTON

Targeting 50% of total vehicle sales to be electric by 2030

1 Third-party forecast of EV load and energy sales resulting from growth in EVs in CNP's Houston electric service territory through 2032

2 https://www.bloomberg.com/press-releases/2022-06-27/electric-vehicle-market-to-reach-usd-823-75-billion-by-2030-registering-a-cagr-of-18-2-valuates-reports



Mayor's Office, and NRG, has a target for EVs to reach 50% of all passenger vehicle sales in Houston by 2030. The growth in EV adoption is driven by declining EV prices, consistent improvements in EV features such as range, and growing awareness that **electricity delivers dramatic annual savings** over gas and diesel.

As shown in the chart to the top, CNP conducted a detailed EV Forecast Study indicating the **adoption of roughly 750,000 EVs** at homes, distribution centers, transit depots, schools and airports across the Houston area by 2032. This is out of a future total vehicle population of 7.5 million in 2032, compared to today's roughly 6 million vehicles operating across the Houston area. It is important to note that this forecast does not include significant additional areas of future electrification growth, including all electric aircraft, off-road vehicles, or building electrification.

Houston area EV adoption growth is representative of the current average national market, but this **growth could be accelerated with a proactive stance** or move along its natural course with a more neutral approach. As an example, the city of Austin takes a proactive stance through aggressive customer education and incentive programs and is on an adoption trajectory that is double that of Houston's. Factors include demographics, commercial mix, local economics, state policy and utility strategy.

CNP HOUSTON EV FORECAST
750,000+ electrified vehicles by 2032

As CenterPoint Energy becomes the primary distributor of fuel for both residential and commercial customers who adopt electrified vehicles, the responsibility and associated impact of reliable and resilient infrastructure will increase.

3 https://www.nytimes.com/2021/09/16/realestate/best-places-electric-cars.html

EV adoption and load growth is expected to grow exponentially in the Houston area

EV adoption spans all vehicle classes in CenterPoint Energy territory

Auto and truck makers are electrifying every vehicle class, as shown in the set of images at the right. The average range of consumer EVs has increased from 114 miles in 2015 to more than 275 miles in 2022, with some EVs exceeding 400 miles of range.

CenterPoint Energy customers interviewed during the recent Transportation Electrification Study indicated many have significant near-term plans to electrify across all vehicle classes. Key findings from these interviews included a strong desire to partner with CenterPoint Energy on planning for their EV charging infrastructure, engage in discussions around available grid capacity, learn about the economic benefits of EVs, and inquire about EV rate structures as offered in other territories.

KEY FINDING

Customers have a strong desire to partner with CNP on EV infrastructure planning

Interviews with CenterPoint customers led to awareness of these vehicle electrification plans

- **Electric buses:** for transit and schools, driven by commitments from the City of Houston
- **Light-duty rental cars and shared ride services:** responding to customer demand
- **Commercial vans - light and medium-duty:** for last mile home delivery
- **Class 8 delivery trucks:** for regional logistics and shipping
- **Electric pickup trucks:** for residential and commercial sector use

Sample customers interviewed:

amazon, Sysco, PEPSICO, TARGET, UNIVERSITY of HOUSTON, utmb Health, CYPRESS FAIRBANKS, FedEx Express, PROLOGIS, Shell, METRO, Walmart, enterprise, PORT HOUSTON

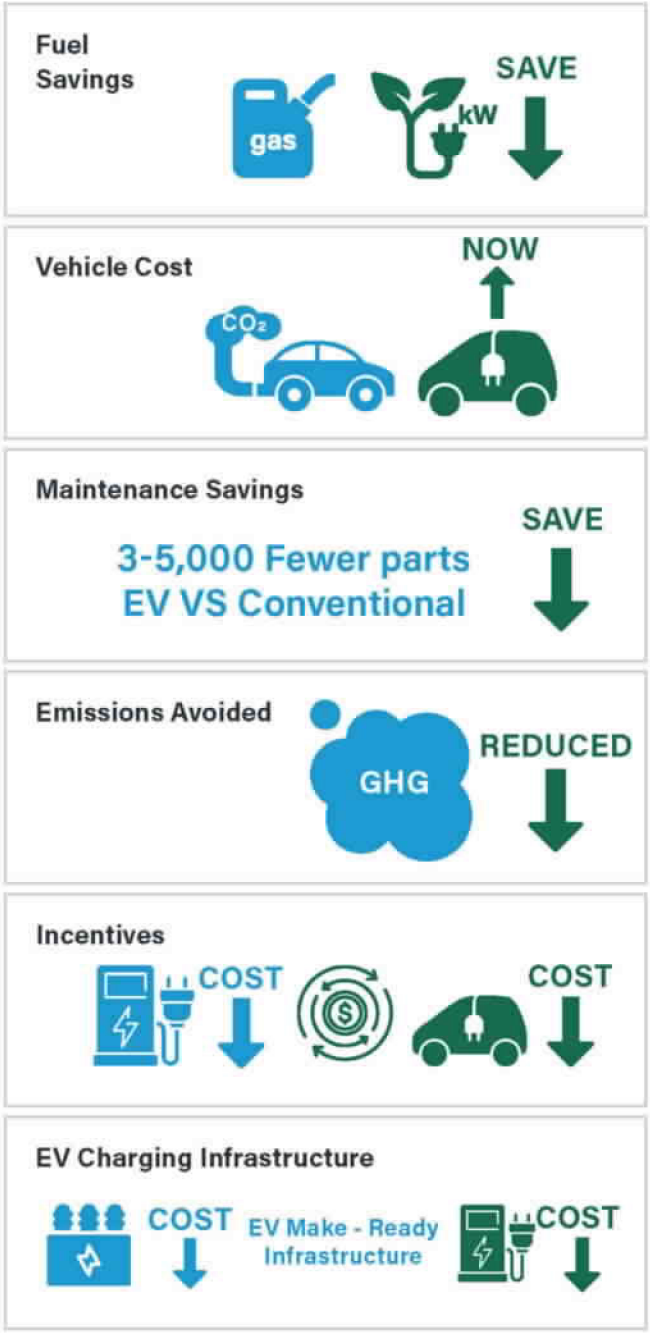
Customer Benefits of Transportation Electrification

CenterPoint Energy is positioned to enable significant economic benefits to customers. A compelling fact is that electric fuel cost is equivalent to paying about $1 per gallon of gasoline for a customer driving a typical EV. This puts real dollars in the pockets of customers who can save as much as $2,000 a year, depending on how much they drive. Fuel savings benefits scale dramatically for commercial customers, who can save millions of dollars a year in fuel costs by replacing diesel and gas fleet vehicles with electric versions.

TE Benefits to CNP Customers

- Lower fuel and maintenance costs
- Tax credits
- Reduced air pollution

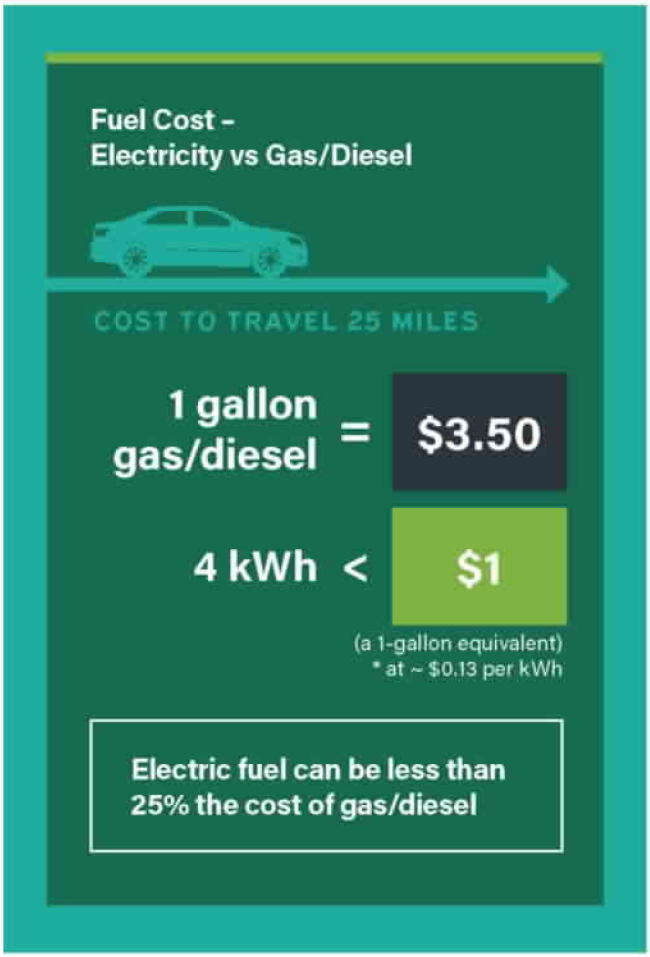
As indicated in the diagram to the right, the Total Cost of Ownership of Electric Vehicles provides residential and commercial customers substantial fuel savings and lower maintenance costs. These savings are aided by recent Federal incentives: Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) that reduce costs of vehicles and charging infrastructure. As a result, Transportation



TRANSPORTATION ELECTRIFICATION - EXECUTIVE OVERVIEW

Electrification is a win-win for CenterPoint Energy, customers and communities: increased CNP growth, more livable cities and net savings to customers.

The illustration below details the cost of electricity as fuel compared to gas or diesel. The cost for an average vehicle to drive 25 miles is around a dollar for a light duty EV versus over three dollars for gas or diesel. This is a major driver of EV adoption.



2

PLANNING FOR TRANSPORTATION ELECTRIFICATION

The benefits of EV growth extends to CenterPoint Energy's business and the impacts are similar to the arrival of air conditioning, when per capita energy consumption rose roughly 40% from the 1940s to 1980s as shown in the diagram on the next page. The transportation sector today, largely by petroleum fuels, accounts for over 1/4th of US energy consumption. The transition to electric vehicles is a significant economic growth opportunity for electric utilities.

The EV Forecast Study completed by CNP teams identified specific impacts from EV

Infrastructure investments required to serve forecasted EV growth are required in the following categories:

- **New and Upgraded Service Transformers** *(existing investment)*
- **Distribution Reconductoring** *(existing investment)*
- **New and Upgraded Substations** *(existing investment)*
- **New and Upgraded Transmission Lines** *(existing investment)*
- **Backup Generation Service** *(new investment)*

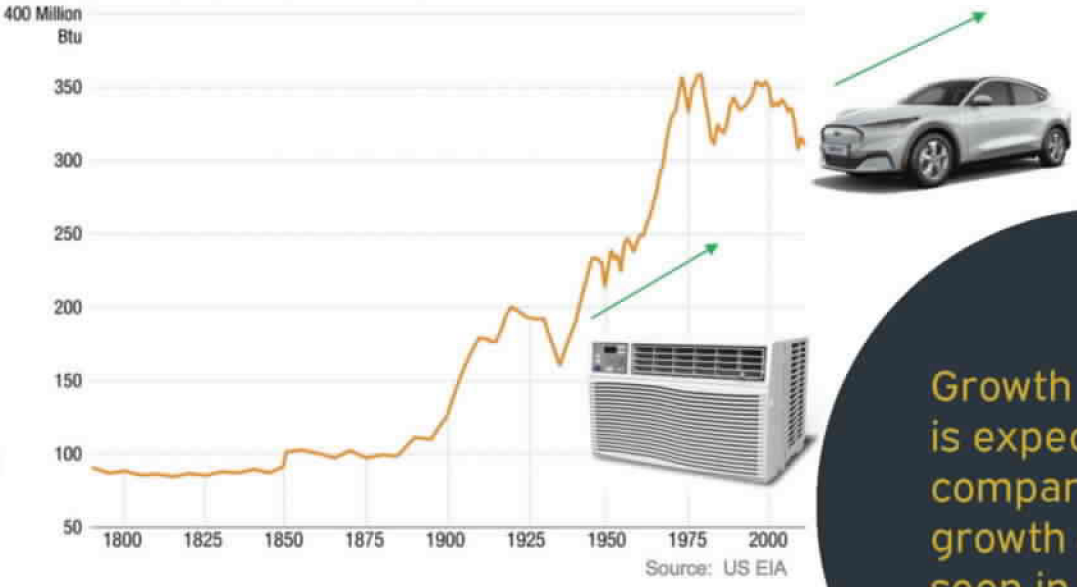
growth that require significant investment in the grid.

The increased capital investment to maintain resilience as a result of EV growth and to support EV charging infrastructure across the territory is estimated to exceed $1.7 billion through 2032[4]. New EV load is also forecast to add roughly 5 TWh in annual energy delivered and over 1.2 GW of contribution to peak load in 2032. With just over 10% of vehicles on the road electrified by 2032, the long-term EV opportunity can be orders of magnitude larger.

> Capital spending and investment required to maintain resiliency under high EV adoption is estimated at over $1.7 billion through 2032[6]

CNP has worked with internal and external teams on a Transportation Electrification Study to identify where on the system EV load may appear over time to plan for related impacts on capacity, reliability, resilience, and energy equity. This study data was used to forecast recommended capital investment. CNP expects EV growth to require system capacity upgrades and investment to maintain resiliency for all customers. This requieres internal CNP teams to leverage EVload forecasts for system planning.

U.S. Energy Consumption, Per Capita (1790-2011)

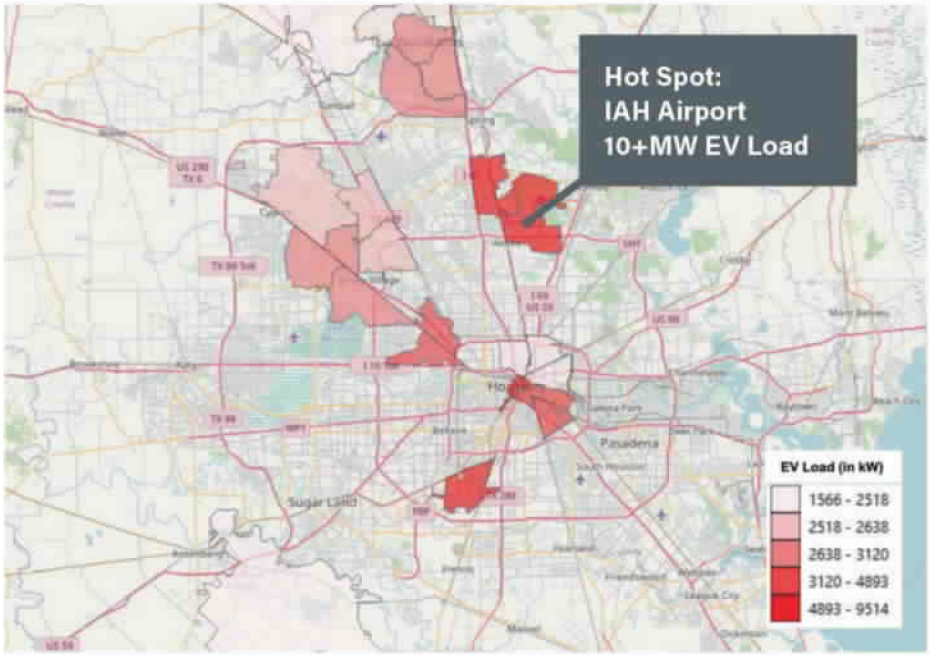


Source: US EIA

Growth in EV load is expected to be comparable to the growth of HVAC load seen in the 1940s through 1980s

4 See page 23

EV LOAD HOT SPOTS BY ZIP CODE



The growth of EV load, and associated hot spots as show in the diagram above[5], brings with it escalating new service requests for electric vehicle chargers from residential, commercial, industrial and public sector customers, who will utilize one of the three categories of chargers shown at the right.

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KEY FINDING

High adoption EV circuits in CNP's Houston service territory may experience more than a doubling of load from EV growth

EV charger types & power levels

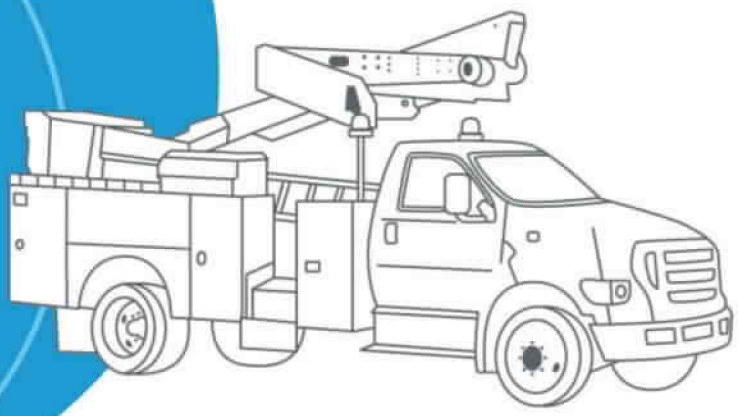
Level 2
10 – 19 kW

DC Fast Charger
50 – 250 kW

Ultra Fast Charger
350+ kW

5 Source: West Monroe

3



RESILIENCE AND ELECTRIC VEHICLE GROWTH

KEY EV RESILIENCY SCENARIO
When customers learn of a storm, EV charging can spike 50% - as high as 1.8 GW in 2032

The Transportation Electrification Study further enabled CenterPoint Energy teams to assess the impacts to resiliency brought on by an increased presence of electric vehicles. As a community impacted by major storms and adverse events, it is critical that customers who increasingly rely on electric vehicles can rely on the high-quality CenterPoint Energy's resiliency with respect to EV charging infrastructure. The challenges of delivering electricity to hundreds of thousands of vehicles during an emergency are immense.

While more than a dozen scenarios were considered, the five presented below are expected to have the highest future probability, impact the most customers, and are within CNP's control. In addition to these scenarios, CNP is exploring other resiliency scenarios, including evacuation congestion and the impact of non-electric factors such as flooding or communications outages that could impact EV owners during major storm events.

The CenterPoint Energy team continues to identify and assess mitigation strategies for additional resiliency scenarios. It is vitally important for CNP to adapt grid planning for EV resiliency challenges, and proactively invest to mitigate these challenges.

With proper planning, the integration of electric vehicles into CNP's service territory can improve resiliency through fuel diversification and access to the nearly ubiquitous electric distribution grid.

SCENARIO		
1	**Pre-Storm Event Demand Spikes**	Customer reaction to storm news drives a surge in EV charging demand, exacerbating capacity issues. **Mitigation Options: expand demand management capabilities**
2	**Utility Storm Response Fleet Charging**	Utility fleets need access to charging to support storm response activities, sometimes for weeks at a time. **Mitigation Options: deploy backup charging at staging locations**
3	**Excessive Outages at Charging Facilities**	High percentage of charging infrastructure goes off-line, leaving customers unaware of where and how to charge. **Mitigation Options: utilize existing mobile generation units and assess procurement of additional units**
4	**Post-Storm Charging Cold Load Pickup**	Spike in EV charging load after storm restoration, in some cases concentrated in high adoption areas. **Mitigation Options: expand demand management capabilities**
5	**Essential Vehicle Charging**	Critical charging loads may need to be prioritization for resilient services and rapid restoration. **Mitigation Options: revise critical EV load restoration priorities**

4

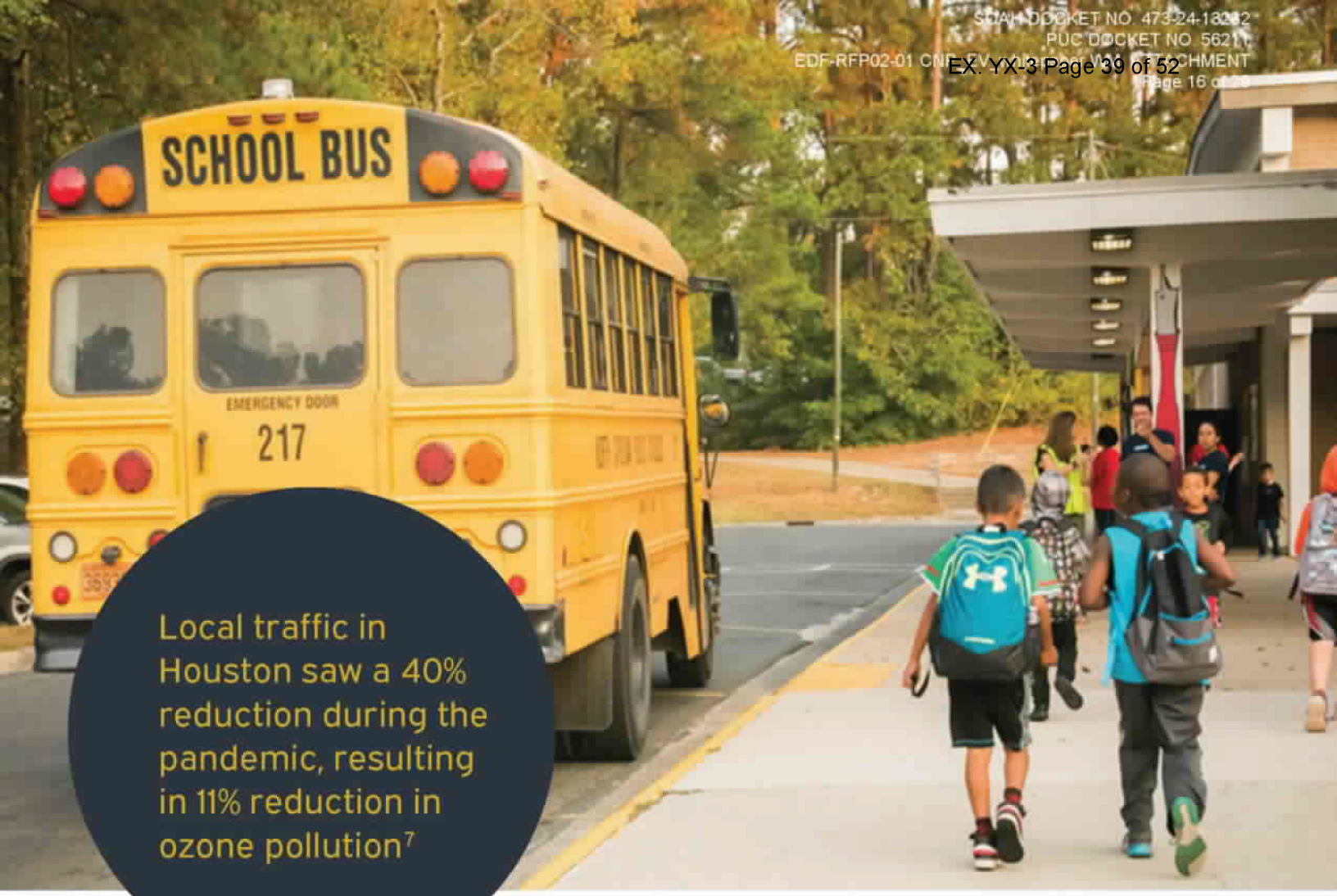
AIR QUALITY IMPACT IN CENTERPOINT ENERGY COMMUNITIES

Transportation has historically impacted public health negatively and is responsible for about 47% of all greenhouse gas (GHG) emissions in the Houston area[6], with tail pipe pollution resulting in poor air quality and associated with health problems including asthma and lung disease. The effects of poor air quality impact all residents in CNP's service territory and have historically disproportionately impacted disadvantaged communities along highways and major roads, due to high levels of vehicle traffic from transit buses, commercial vehicles, and commuter traffic.

The increase of EV vehicle adoption can play a major role in reducing tail pipe emissions from the transportation sector. Preliminary research shows that electrification of transit buses, commercial delivery vehicles, and consumer vehicles can make a measurable reduction in air pollution. This will be particularly beneficial to disadvantaged communities (DACs) even if residential EV adoption remains low in these communities. DACs are disproportionately burdened by the negative effects of commercial and public transit vehicles.

The increase in electric vehicles is one solution that achieves significant reduction in air pollution for target communities. When supporting Transportation Electrification charging infrastructure and engaging in customer EV education, CenterPoint Energy can play a key role in **supporting increased EV adoption that**

6 https://www.npr.org/sections/health-shots/2020/05/19/854760999/traffic-is-way-down-due-to-lockdowns-but-air-pollution-not-so-much

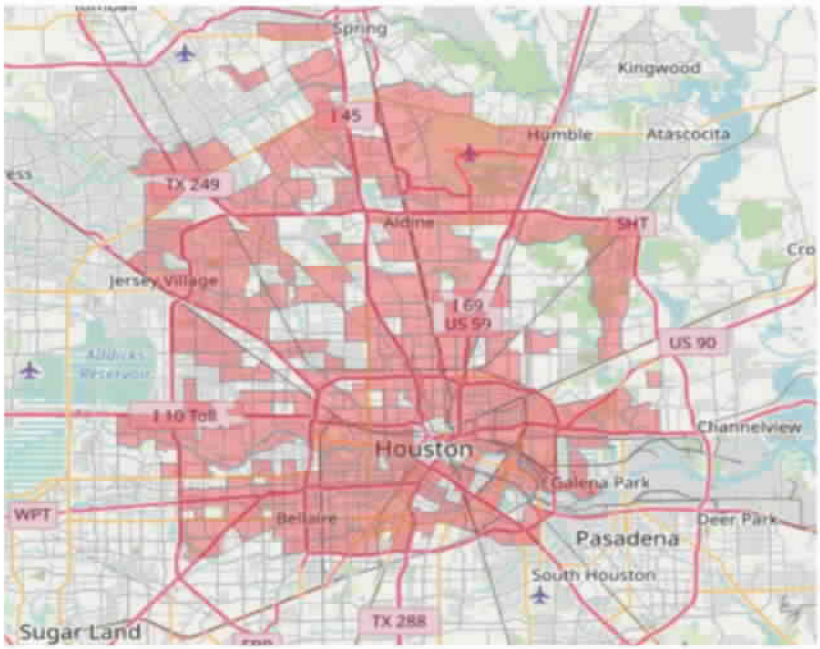


Local traffic in Houston saw a 40% reduction during the pandemic, resulting in 11% reduction in ozone pollution[7]

can lead to better air quality for all communities in its service territory.

As CenterPoint Energy teams engage with customers across the service territory and in target communities, knowledgeable team experts provide key education and understanding to fleet owners who are considering converting to electric and requesting new EV charging infrastructure. Increasingly, these conversations are helping customers realize improved air quality for our employees and communities.

HIGH POLLUTION CENSUS TRACTS IN CNP TERRITORY[7]



7 https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

5

COMMUNITY SUPPORT THROUGH ACTION AND COLLABORATION

Evolve Houston's work includes:

- **Targeting areas with the poorest air quality and related health impacts**
- **Support training programs and education for careers in eMobility (e.g., hosting electric ride and drive events)**
- **Support expansion of eMobility access communities with relatively fewer transportation options**

CenterPoint Energy is collaborating with Evolve Houston in city-wide efforts to improve air quality via Transportation Electrification. Evolve Houston is a non-profit, EV advocacy consortium kickstarted by the City of Houston, CenterPoint Energy, NRG, and others. Evolve Houston's objective is to accelerate transportation electrification and reduce GHG emissions across Houston, with a focus on awareness, affordability, availability, and equity.

EVOLVE HOUSTON

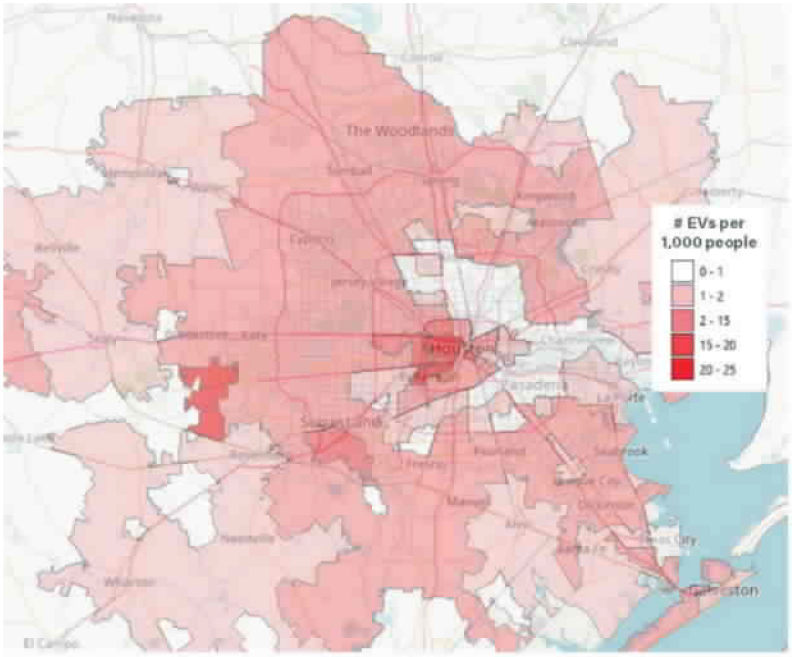
DIVERSITY, EQUITY & INCLUSION

In addition to supporting partners like Evolve, CNP is taking direct action in the community in a number of ways, including:

- **Electrifying a portion of its own field service fleet, contributing to cleaner air across Houston**
- **Contributing to customer education around vehicle electrification by providing information on its website and through direct outreach to commercial customers**
- **Creating CNP's EVPoint, an internal EV affinity group intended to spread education and advocacy for EVs throughout the organization**

CNP is aware of the importance of collaborating with community organizations, the City of Houston, retail energy providers, regulators, and Houston colleges and universities to increase access to electric modes of transportation, as well as identify areas for collaboration to help further support the benefits of electrification being realized in all of our communities.

EV LOAD HOT SPOTS BY ZIP CODE



EXISTING / PLANNED CHARGER LOCATIONS IN CNP'S HOUSTON TERRITORY[7]

Despite the expectation of significant growth of transportation electrification in the Greater Houston area, there remains significant barriers to EV adoption across all customer segments. With the projected growth of the EV market and the robust goals set by community organizations like Evolve Houston, it is paramount to identify and explore the barriers to EV adoption.

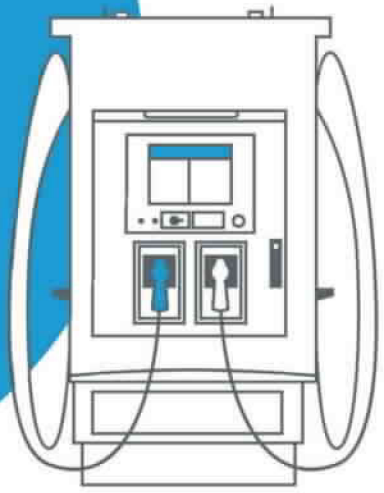
CenterPoint's recent Transportation Electrification Study found that 50% of residential EVs are concentrated in 20% of Houston zip codes today, a trend that is expected to continue under current market conditions. Equitable access to the benefits of electric transportation will only be achieved once all of the factors on page 19 are addressed. And because some of these accessibility issues are only loosely within CNP's control, the importance of community partners participation is paramount.

Barriers to Transportation Electrification present opportunities for CenterPoint through its partnerships to improve access to electrified transport in their preferred mode of transportation.

The list below presents a**reas where CenterPoint may be able to positively impact barriers to EV adoption** and access to EV infrastructure:

- **Charging Infrastructure Financial Support -** the top barrier for commercial customers is the upfront cost of EV charging infrastructure, an area where utilities can provide a range of solutions.
- **Education and Awareness -** given the relative newness of EVs, customers need to be educated and made aware of vehicle availability, technology, and operations.
- **Understand Total Cost of Ownership -** for customers to make the leap to an EV, they need to be able to afford the vehicle, or fleet of vehicles, or fleet of vehicles, considering purchase price, incentives, fuel, and maintenance.
- **Vehicle Availability -** manufacterers need to produce vehicles that meet the needs (i.e.,size, range,and form factor) of all consumers particularly in disadvantaged communities.
- **Electrified Transit -** where direct vehicle ownership is less prevalent, access to electrified public transit and microtransit can be enabled as additional transport options.

6



TRANSPORTATION ELECTRIFICATION AND CENTERPOINT ENERGY OPERATIONS

The electrification of transportation will impact CenterPoint Energy employees in key areas and create diverse issues and opportunities. The table below lists examples of impacts to key areas, presenting areas where **CNP can expand employee education and EV related program design:**

Key Areas	Roles and Activities Driven By EV Growth
Energy Solutions	As commercial and residential customers seek information around adopting EVs, the cost to their bill, and opportunities to collaborate with their utility, CenterPoint Energy team members will increasingly engage with customers to facilitate adoption through education of the benefits of electrification and guidance on how to approach the transition.
Service Delivery	New service requests for EV charging infrastructure are increasing. This will require CNP team members to respond to and act on inquiries in a timely manner demonstrating expertise in rates and capacity availability, and the ability to mobilize construction promptly to maximize the likelihood that customers move forward with their deployments in the Houston area.

Engineering and Planning	Increased EV load will impact CNP grid planning and infrastructure engineering activities. These efforts will require proactive monitoring and deployment of grid upgrades as EV charging hot spots emerge and large customers request significant new capacity for EVs.
Grid Hardening and Modernization	An increasing EV load requires team members to ensure distribution assets are sufficiently hardened to meet the needs of customers who will rely on electric transportation in adverse events, and exploring EV load management to address capacity constraints.
Fleet Services	As CenterPoint adopts EVs into its service fleet to reduce corporate carbon emissions and capture cost savings, field crews and facilities team members will utilize new EV and EV charging equipment and will adapt to electric fuel resiliency during storm response.
Regulatory and Legislative Affairs	New capital spending recovery mechanisms, approvals and/or new EV-related rate structures would further enable CNP to upgrade grid infrastructure for high EV adoption, requiring team members to strategize and overcome regulatory challenges in securing necessary approvals.
All Employees	Collaboration across departments will be critical for CNP teams to adapt to the fast pace of change introduced by Transportation Electrification, enabling the ability to effectively address both customer needs and the goals of the organization.

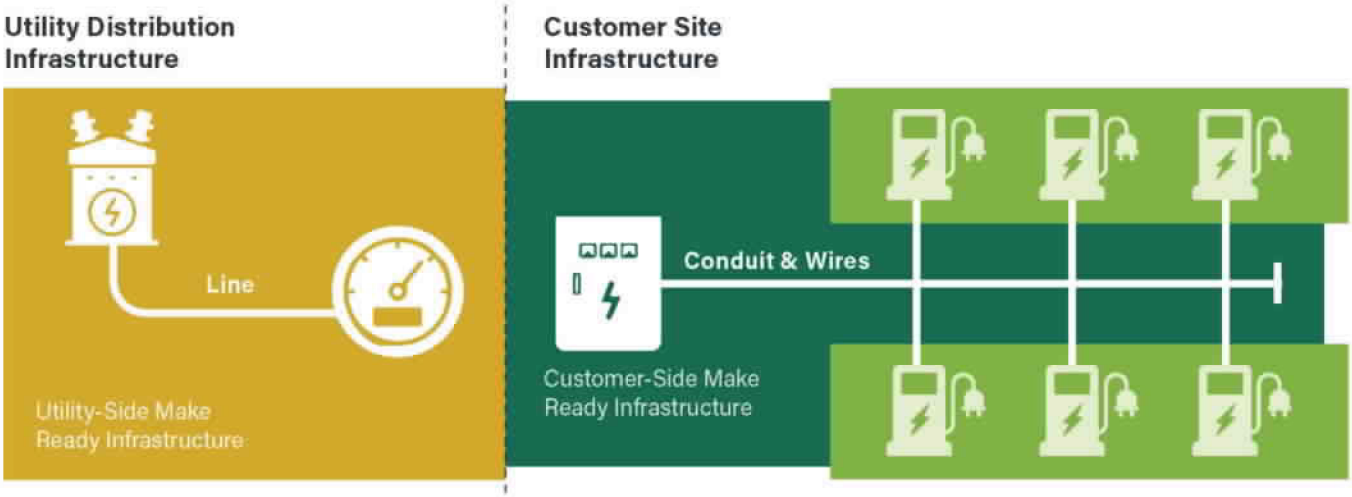
EV growth will impact all CNP departments creating an opportunity to upskill teams on EV knowledge

Transportation Electrification Regulatory Initiatives

The electrification of transportation **requires CenterPoint Energy to engage in new regulatory efforts** and government affairs initiatives. These efforts will impact the extent to which CNP can recover costs of infrastructure upgrades prompted by EV charging load and resiliency requirements and affect EV load growth. Considering the barriers to electrification presented previously, **CNP has the opportunity to be proactive in accelerating EV adoption**. To take an aggressive growth approach, regulatory and potentially legislative efforts would be needed to incentivize EV adoption, offer rates attractive to EVs, and address the upfront cost of EV infrastructure through a range of activities and incentives.

> **EV GROWTH ACCELERATION**
> requires new regulatory strategies & approvals

EV CHARGING STATION INFRASTRUCTURE: KEY CUSTOMER COST BARRIER



- **Utility-Side Make Ready:** service transformer, line to meter, meter
- **Customer-Side Make Ready:** service panel, cabling to chargers, pad
- **EV Charger Station:** operation and ownership by Customer

POTENTIAL CAPITAL INVESTMENTS AND TRANSPORTATION ELECTRIFICATION PROGRAM SPEND (THROUGH 2032 – A PRELIMINARY ROUGH ESTIMATE)

New and Upgraded Service Transformers	**$160M**
New and Upgraded Distribution Reconductoring	**$810M**
New and Upgraded Substations	**$150M**
New and Upgraded Sub-Transmission & Transmission	**$350M**
Make Ready Costs – EVSE New Service	**$35M**
EV Charging Back-Up Generation	**$100M**
EV Adoption Acceleration Initiatives	**$100M**
Total Transportation Electrification Investment	**$1.7B**

The list of potential TE program spend opportunities in the table above, developed by a working group of multiple CNP departments, includes a range of grid infrastructure equipment investment, charging infrastructure financial support, and other initiatives that can accelerate EV adoption and support resilience. There are certain initiatives CenterPoint could pursue that would exist as extensions of current program activities that would still require regulatory approval, such as expanding existing energy efficiency and back-up generation activities.

Additional opportunities to accelerate EV adoption include customer engagement, marketing and education around EV benefits, either directly or indirectly through partners. This education would benefit both CenterPoint and its customers by reducing information barriers to customer adoption and giving customers awareness about the diversity of options for electrified transportation, both at the residential and commercial segments.

Transportation Electrification and CenterPoint Energy Operations

The electrification of the transportation sector is potentially the greatest economic growth opportunity for CNP in the coming decades. It is **a growth opportunity that CenterPoint Energy can directly impact**, rather than taking a passive position. In addition, from the standpoint of the City of Houston and the communities where CenterPoint Energy employees live and work, there is new competition among metropolitan areas for the perception of being innovative, being a "smart city," and advancing the societal, job creation, and air quality benefits of electrification. This makes TE not only a CenterPoint growth opportunity, but also an opportunity to advance the goals of the City and other local communities.

Valued customers and potential new businesses have indicated that their corporate expansion plans hinge on the readiness of local utilities to meet new electricity service requests such as the capacity and speed to provide EV charging infrastructure. CenterPoint will be competing against peer utilities for EV load growth, and a proactive approach shows that the Houston area is a prime location for commercial electrification efforts.

PROACTIVE STEPS IN MOTION TODAY AT CENTERPOINT AND OTHERS REQUIRED TO ENABLE EV GROWTH:

Today	In Planning	In Evaluation
• Converting Light Duty Field Service Fleet to EVs • Community Partnerships to Influence Electrification • Manage Customer EV Charger New Service Requests • Handling Customer Inquiries Around EV	• Capacity Upgrades: Service, Distribution & Substation • Boosting EV Resiliency for Adverse / Storm Scenarios • Backup Generation Needs for EV Charging	• EV Peak Load Demand Management • EV Make-Ready Program – Utility Side & Customer Side • Customer EV Education Tools and Initiatives • Rate Tariffs or Incentives Specific to EV Ownership
Current plans exist to convert light duty fleet vehicles to EV, with future assessment of light duty pick ups. In partnership with Evolve Houston, CNP teams engage with the community on EV education. New Service and engineering teams are working with customers on EV charger infrastructure deployments. A dedicated set of CNP experts respond to EV related inquiries to meet customers EV needs.	New EV Load hot spots have been identified, enabling grid operations teams to plan infrastructure upgrades. CNP resiliency planning teams are preparing for new EV related resilience procedures. Teams are planning backup power for EV charging hubs for CNP service fleets and critical customer facilities. Customer education around EV benefits is key, to reach both commercial and residential customers, including early planning on outreach campaigns and digital tools.	CNP planning groups are assessing new strategies to align future EV load to balance grid capacity. Leaning on 15 years of success of CNP's Clean Air Technologies program, address the high upfront cost of EV infrastructure for customers. Because EV load growth is a net positive for CNP, customer education can accelerate EV adoption. To accelerate EV adoption requires evaluating new ways to incentivize EV adoption and grow margin.

Recommendations and Next Steps

Key Areas	Recommendations
Distribution & Transmission Planning	Continually assess the impacts of near and long-term EV adoption on distribution, substation, and transmission assets. Plan for significant incremental capital spend to increase capacity and improve resilience.
New Services	Seek legislative and regulatory approval to provide back-up generation for EVs and manage charging load profiles.
Charging Infrastructure Investment	Design, gain regulatory approval and provide financial incentives to commercial customers for make ready infrastructure and charging station deployment where the private market is not active.
Partnership Development for Education/Marketing	Support community partners with financial and human resources to educate customers about the benefits of electrification.
Legislative and Regulatory Action	Pursue legislative and regulatory action to support rate recovery for the above actions, as early as 2023 for 2024 approval.

7

AN EV FUTURE OF OPPORTUNITY

Future State: Imagine an excited CNP field crew worker unplugging a Ford F150 Lightning field service truck and driving to a worksite, knowing they can plug in their power tools directly into electric plugs in the back of the truck. Picture children at a Cypress Fairbanks school standing right next to their new electric school buses with no exhaust filling the air. Visualize local last mile food delivery vans pulling into your driveway in clean quiet electric delivery vans and emergence of fully electric aircraft. This is the electric future emerging in the CenterPoint Energy Houston territory, and it is an exciting future to look forward to.

Transportation Electrification presents an opportunity for CenterPoint Energy to participate in a bright new future that provides benefits to customers, communities, and the organization. In addition to the economic benefits, EVs present a safe and fun driving experience and improve air quality. With this change comes a new opportunity for the business to grow, for team members to learn new cutting-edge skills, to collaborate across departments, and interact with customers in new ways.

Meeting the needs of customers and stakeholders around EV charging infrastructure is key to CNP's success, and the ability to understand this new category of EV load enables solutions that address new resiliency and planning challenges.

Education about Transportation Electrification should occur across the entire organization to encourage collaboration to solve new challenges,

and maximize CenterPoint Energy's ability to manifest the organizational and customer benefits of electrification. As CNP teams become increasingly familiar with the key elements of Transportation Electrification, the result is a more innovative company, one where teams can guide customers to adopt electrification in a way that aligns with company resiliency and growth goals.

Key Themes: Business Growth – Cleaner Air – Collaboration

Transportation Electrification will not only require greater internal collaboration, but it will also require expanded customer engagement and community collaboration. This growth of EV adoption and EV charging presents a new era for CenterPoint Energy. It is an era marked by potential for strong new margin growth, a more robust and reliable grid, and cleaner air—achieved in partnership with satisfied stakeholders.

Questions about Transportation Electrification?

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CenterPoint Energy

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§ § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

DIRECT TESTIMONY

OF

CHRIS HICKMAN

ON BEHALF OF

ENVIRONMENTAL DEFENSE FUND

JUNE 19, 2024

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF ACRONYMS

CaaS	Charging as a Service
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
EV	Electric Vehicle
MCS	Megawatt Charging Standards
MHDV	Medium- and Heavy-Duty Vehicle
NWA	Non-Wires Alternative
V2G	Vehicle-to-Grid

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND AFFILIATION.

A. Christopher Wayne Hickman. I am the CEO of Creation Energy, LLC, and CEO of the non-profit company Collaborative Utility Solutions.

Q. PLEASE DESCRIBE YOUR BACKGROUND AND PROFESSIONAL EXPERIENCE IN THE ENERGY AND UTILITY INDUSTRIES.

A. I received my Bachelor of Science in Electrical Engineering from New Mexico State University. I received my Master of Electrical Engineering from the Electric Utility Management Program at New Mexico State University, I received my MBA with a concentration in policy and planning from the Anderson School of Management at the University of New Mexico. I began working in the power industry as an intern in 1991 and have worked with the industry—over 31 years. During that time, I worked inside a utility, Public Service Co. of New Mexico, from 1991 to 2004. Following my time at PNM, I provided support as a consultant for a variety of state and federal policy initiatives: The Energy Policy Act[1] and, the Energy Independence and Security Act[2] and many different Automated Metering Infrastructure cases from 2004 to 2007. Beginning in 2008, I focused my efforts on enabling Distributed Energy Resources (DERs). I supported more than a dozen countries around the world in the development of energy policy related to DERs and markets. I also helped support multiple DER-related companies and startups. Currently,

[1] Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (codified as amended in scattered sections of 2, 11, 15, 16, 25, 26, 30, 31, 33, 38, 40 and 42 U.S.C.A.) (West 2013 and Supp. 2014).
[2] Energy Independence and Security Act of 2007, 42 U.S.C.A. §§ 17001-17386 (2007) (EISA).

Creation Energy, a for-profit entity, and Collaborative Utility Solutions, a non-profit entity, both focus on supporting effective evolution of DER incorporation into the grid and markets in a manner that supports overall reliability and efficiency of the power grid while helping move us collaboratively towards an affordable, clean energy future.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. Environmental Defense Fund (EDF).

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR DIRECT TESTIMONY.

A. My testimony examines the reasonableness of certain CenterPoint processes, which informed CenterPoint's investments and revenues through the rate year, as they pertain to medium- and heavy-duty vehicle (MHDV) electrification. My testimony primarily evaluates and includes recommendations regarding CenterPoint's load forecasting, infrastructure planning and deployment, and operations processes as they relate to ongoing and projected growth in electrification loads. I also offer discrete recommendations intended to facilitate the efficient siting and energization of electric MHDV loads.

Q. ARE YOU SPONSORING ANY EXHIBITS IN SUPPORT OF YOUR DIRECT TESTIMONY?

A. Yes, I am sponsoring three Exhibits, including: Southern California Edison's Unit Cost Guide (Exhibit CH-1); CenterPoint's Responses to EDF's RFI02-01, 04-05; RFI03-03

(Exhibit CH-2); and an excerpt from CenterPoint's Retail Tariff, Sec. 6.3.4.2 (Exhibit CH-3).

Q. WAS YOUR TESTIMONY, INCLUDING ASSOCIATED SCHEDULES, WORKPAPERS, AND EXHIBITS, PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION AND CONTROL?

A. Yes.

II. ELECTRIC MHDV LOADS GENERALLY

Q. PLEASE SUMMARIZE HOW INCREASED MHDV ELECTRIFICATION COULD IMPACT ELECTRIC UTILITIES.

A. MHDV electrification presents both challenges and opportunities for electric utilities. As EDF witness Xie discusses, deployments of electric MHDVs are projected to accelerate significantly over the coming years.[3] The vehicles will produce substantial corresponding charging demands on electric utilities, including within CenterPoint's service territory.[4] By a forecast it commissioned in 2022, CenterPoint projected at least 1.2 GW peak load increase by 2032 to serve EV-related demand.[5]

Any material changes in the extent or nature of customers' electricity use can affect how electric utilities plan and operate their system. But MHDV electrification presents unique considerations compared to other forms of load growth. First, MHDV charging

[3] Direct Testimony of Yihao Xie, at 6: 5-8.
[4] *See* EDF RFP02-01, CenterPoint Energy Mobility White Paper, 2022 (Exhibit YX-3, p. 25-26).
[5] *Id.*

loads can be substantial—for example, megawatt charging systems (MCS) under development contemplate ultrafast chargers, operating at 1 MW or more per charger, for en-route truck charging.[6] Additionally, the direct testimony of Rina Harris refers to CenterPoint experiencing ". . . a tremendous increase in interconnection requests as large customers seek to electrify their existing operations that have traditionally been powered by internal combustion engines. . ."[7]

Second, MHDV charging loads can contribute to increasing load density utilities can expect on their distribution systems, which can have significant consequences for both system planning and operation. Load density describes the watts per square foot expected from different types of loads in a utility's service territory, such as a 'typical' customer home, a 'typical' commercial customer, etc. Utility planners use load density assumptions, together with predicted mixes of each of these customer types and other assumptions, to predict the load they expect to serve in a specific geographic area.[8] This then informs the infrastructure needed to serve this load. Incoming MHDV and other electrification loads

[6] *See, e.g.,* Press Release, Siemens, Megawatt Charging System from Siemens delivers 1 MW charge for the first-time during testing (Apr. 24, 2024), *available at* https://press.siemens.com/global/en/pressrelease/megawatt-charging-system-siemens-delivers-1-mw-charge-first-time-during-testing; Press Release, ChargePoint, ChargePoint Announces Three Megawatt Charging Architecture to Electrify the Future of the Trucking Industry (May 16, 2024), *available at* https://www.chargepoint.com/about/news/chargepoint-announces-three-megawatt-charging-architecture-electrify-future-trucking; *See also* CHARIN, MEGAWATT CHARGING SYSTEM (MCS): RECOMMENDATIONS AND REQUIREMENTS FOR MCS RELATED STANDARDS BODIES AND SOLUTIONS SUPPLIERS (2024), *available at* https://www.charin.global/technology/mcs/.

[7] Direct Testimony of Rina H. Harris, at 3:6-8.

[8] *See, e.g.*, Presentation, Michael Coddington & Kevin Schneider, *Utility Distribution Planning 101* (Lawrence Berkeley National Laboratory, Mar. 11-2, 2020), https://eta-publications.lbl.gov/sites/default/files/4_-_coddington-schneider_utility_distribution_system_planning_101.pdf.; *See also*, Presentation, *Commercial Buildings Energy Consumption Survey: Consumption and Expenditure Highlights*, (U.S. Energy Information Administration, 2018), https://www.eia.gov/consumption/commercial/data/2018/ppt/CBECS%202018%20CE%20Release%202%20Flipbook.pptx

are likely to drive rapid increases in effective load densities. I discuss load densities in further detail, and make recommendations, later in my testimony.

Third, MHDV charging loads will not emerge uniformly across utility service territories, or all at once. Rather, as described in the direct testimony of Yihao Xie, MHDV loads will tend to arise first at "first-mover" locations, such as depots and ports, and spread outward over time.[9]

Fourth, MHDV charging loads can behave more flexibly than traditional loads. Depending on the nature of their business, MHDV customers may have the operational flexibility, technological capability, and economic incentives to "shape" their charging demands. They may also store and inject electricity onto utility systems as vehicle-to-grid (V2G) technologies and managed charging platforms continue to mature. As I discuss later in my testimony, these characteristics have the potential to make electric MHDV chargers a powerful grid asset, though not without some effort by distribution system operators.

Fifth, electric MHDV charging customers, which have historically relied on fossil fuels, may be less familiar with electric power systems and utility rules than other major electric consumers with decades of experience using electricity as a primary fuel. This experience gap is particularly acute given the comparatively sophisticated characteristics of MHDV loads discussed above, and frequently warrants additional engagement between the utility and the customer, as CenterPoint witness Harris discusses in her testimony.[10]

[9] Direct Testimony of Yihao Xie, at 10:6-9; *See also*, National Zero Emission Freight Corridor Strategy (Exhibit YX-2, p. 4-5).
[10] Direct Testimony of Rina Harris, at 6:11-15.

Q. PLEASE DESCRIBE THE DEVELOPMENT AND FUNCTIONALITIES OF VEHICLE-TO-GRID TECHNOLOGIES.

A. As I suggested above, effective deployment of V2G functionalities have the potential to significantly increase the value of electric MHDVs as a grid asset. V2G refers to the ability of EVs to inject electricity, or provide other grid services such as voltage support, to the distribution system. V2G concepts recognize that the electric industry is making use of stationary batteries across its system to help provide support to the grid, so there is a natural evolution to take advantage of 'mobile batteries' as well. This is relatively new for the industry, although utilities, EPRI, Pecan Street and other stakeholders continue to study the potential uses of this technology.[11] Due to the size, scale and distributed nature of MHDVs, these 'mobile batteries' can have a positive impact on the grid if effective collaboration between the utility and their customers is enabled in this process.

When deployed at scale, V2G has the potential to provide a number of value streams to utilities. Benefits like Power Factor Correction, Phase Balancing, and post solar peak mitigation are already relatively well-understood.[12] However, some use cases require further research, such as the possibility of utilizing MHDV fleets to serve an entire distribution feeder for a period if the substation is down. As utilities continue to evaluate distributed energy resource management system (DERMS) platforms and non-wires

[11] *See e.g.,* PECAN STREET, *supra* note 8; *See also* EPRI EROADMAP, https://eroadmap.epri.com/

[12] Power Factor Correction refers to a set of techniques used to improve the power factor of an electric system, i.e., the ratio of apparent power to real power. Phase balancing, also known as load balancing, is the process of distributing electrical loads evenly across different phases of an electric system. Solar peak mitigation is a strategy for eliminating demand spikes by reducing electricity consumption through battery storage systems etc.

alternatives (NWAs) to capital projects, V2G will play a substantial role in the next stage of research and experimentation.

Q. WHAT DO THESE CHANGES MEAN FOR ELECTRIC TRANSMISSION AND DISTRIBUTION UTILITIES?

A. These changes will significantly influence how electric utilities plan, design, deploy, and operate their systems, as well as the costs of such systems. As we move forward, utilities will continue to be asked to deliver safe, reliable, and affordable service. To accommodate the above trends, utilities will need to—at minimum—expect the combined watts per square foot of their service areas to significantly increase going forward. This means utilities must anticipate and reserve a corresponding level of capacity on new infrastructure to prepare to serve these loads. It also has implications for how utilities will need to locate and size infrastructure in areas with existing utility service, as I describe in further detail below.

Q. WHAT DO THESE CHANGES MEAN FOR UTILITY CUSTOMERS?

A. As discussed above, MHDV electrification stands to significantly benefit utility customers by reducing operating costs and improving environmental performance overall. Setting aside the myriad public health and quality-of-life advantages electric trucks and buses can deliver to residents, they can also provide electric rate benefits.[13] Several studies have

[13] *See e.g.,* LUCY METZ ET AL., DISTRIBUTION INVESTMENTS TO ENABLE MEDIUM- AND HEAVY-DUTY ELECTRIFICATION (Synapse Energy Economics, Prepared for EDF, Apr. 2023), *available at* https://www.edf.org/media/worth-investment-report-finds-utilities-fleet-owners-consumers-benefit-when-utilities-

demonstrated that MHDV charging tends to put downward pressure on electric utility rates because electric MHDVs tend to generate more utility revenues then their incremental cost to serve.[14] This is especially true if charging infrastructure has been appropriately planned for in advance and is ready to accept these new loads. One study suggests that during the period 2011-2021, EV customers in the United States contributed about $2.44 billion in utility revenues in excess of the utilities' marginal costs to serve those customers.[15] These revenues can serve to offset overall electric rate increases for all rate classes.

Effective incorporation of MHDVs into utility system planning and operations can further broaden and amplify these benefits. First, timely preparation of the distribution system to accommodate new MHDV loads can accelerate the pace—and potentially the magnitude—at which resulting revenues accrue to the benefit of utility customers.[16] Second, encouraging new MHDV customers to locate in areas with existing distribution system capacity can help enable new loads to come online with minimal corresponding incremental costs. Third, increased coordination with the utility for MHDV managed

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cover; *Accord* CALIFORNIA PUBLIC ADVOCATES OFFICE, DISTRIBUTION GRID ELECTRIFICATION MODEL STUDY AND REPORT (Aug. 2023), *available at* https://www.publicadvocates.cpuc.ca.gov/press-room/reports-and-analyses/distribution-grid-electrification-model-findings (the cost of providing electric service to EV chargers--including the costs to upgrade the system--are recovered across more units of electricity sold and electrification may cause downward pressure on electricity rates); SARAH SHENSTONE-HARRIS ET AL., ELECTRIC VEHICLES ARE DRIVING RATES DOWN FOR ALL CUSTOMERS 1 (Synapse Energy Economics, Prepared for NRDC, Jan. 2024), *available at* https://www.synapse-energy.com/evs-are-driving-rates-down; MULTI-STATE TRANSPORTATION ELECTRIFICATION IMPACT STUDY: PREPARING THE GRID FOR LIGHT-, MEDIUM-, AND HEAVY-DUTY ELECTRIC VEHICLES (National Renewable Energy Laboratory, Lawrence Berkely National Laboratory, Kevala, Inc., and U.S. Dept. of Energy, 2024), *available at* https://www.energy.gov/sites/default/files/2024-03/2024.03.18%20NREL%20LBNL%20Kevala%20DOE%20Multi-State%20Transportation%20Electrification%20Impact%20Study%20FINAL%20DOCKET.pdf (EV-related consumer benefits exceed estimated cost of charging and grid infrastructure costs in scenarios consistent with EPA proposals); *See also* EPA, GREENHOUSE GAS EMISSION STANDARDS FOR HEAVY-DUTY VEHICLES: PHASE 3 (Mar. 2024).

[14] *Id.*

[15] S. SHENSTONE-HARRIS ET AL., *supra* note 13.

[16] M. WHITED ET AL., *supra* note 13.

charging can further mitigate the capital investments needed to serve EV and non-EV loads alike. This effective coordination can help utilities like CenterPoint improve their overall utility load factor and can also produce reliability and resiliency benefits.[17]

Q. WHY IS IT APPROPRIATE FOR UTILITIES TO EMPLOY A FORWARD-LOOKING APPROACH WITH RESPECT TO DISTRIBUTION SYSTEM PLANNING AND DEPLOYMENT?

A. As a threshold matter, it should be noted that this concept is not particularly new. Utilities already actively anticipate the locations and magnitudes of future loads and use those projections to inform their capital deployment plans. Studies from the Department of Energy and other industry organizations continually attempt to classify and predict future load on the grid through profiles of site characteristics.[18] Estimated loads for different building types informs overall load density expected in a given area, which then guides utilities' plans to serve those loads. Thus, while incoming MHDV and other electrification loads are certainly unique in some ways, proactive planning for such loads represents an evolution—rather than wholesale reinvention—of the utility planning paradigm.

Anticipatory planning and investment are appropriate for several reasons. Most importantly, utility infrastructure can remain in service for decades. For example, as CenterPoint witness Dane Watson notes in his direct testimony, "The Company's engineers noted that the Company has changed from wood to concrete poles, which have a much longer life expectation. Consequently, Company engineers now expect poles to realize a

[17] Coddington & Schneider, *supra* note 8.
[18] *Id.*

service life of approximately 60 years."[19] Customers pay for such infrastructure over corresponding multi-decade timespans. It is therefore reasonable to expect utilities to consider long-term scenarios when determining the types, sizes, and locations of these facilities.

Anticipatory planning can also mitigate future costs. New or greenfield grid expansions tend to have lower costs on a per-unit basis than retrofitted infrastructure. For example, in 2019, Southern California Edison listed the reconductor cost for overhead systems between $130/foot and $180/foot.[20] In comparison, new construction for overhead systems is between $90/foot and $120/foot.[21] This is due to a variety of factors; for example, the electric grid is typically installed as one of the first elements of infrastructure expansion with water, sewer and roads, and therefore needs to contend with comparatively fewer community impacts than infrastructure in an area that has already been developed. If infrastructure is initially constructed with the capacity to serve future loads at a higher load density, new loads can be accommodated with minimal costs and impacts. However, if infrastructure is initially undersized, it may require retrofits while existing infrastructure remains energized, which significantly increases project costs and challenges.

Moreover, iterative facility retrofits caused by failure to anticipate loads can lead to short-term ability to serve the new loads but lead to much higher long-term costs. For example, consider ten businesses on a single distribution feeder that convert their vehicle fleets to EVs over a ten-year period. The first such conversion may trigger a feeder

[19] Direct Testimony of Dane Watson, at 15:13-16.
[20] Southern California Unit Cost Guide, 2019 (Exhibit CH-1, p.2).
[21] *Id.* at 1.

reconductor project that creates the capacity to serve up to five additional fleet conversions. However, eventually, additional substation capacity will be needed to serve all ten customers. If new substation capacity is planned and installed to segment the feeders now, the utility can reduce the load on many different feeders—enhancing service to the entire area while also potentially eliminating or deferring the need for feeder reconductor projects, thus more effectively utilizing their existing distribution infrastructure.

By way of illustration, consider a simple one-line representation of a utility distribution system below in Figure 1.

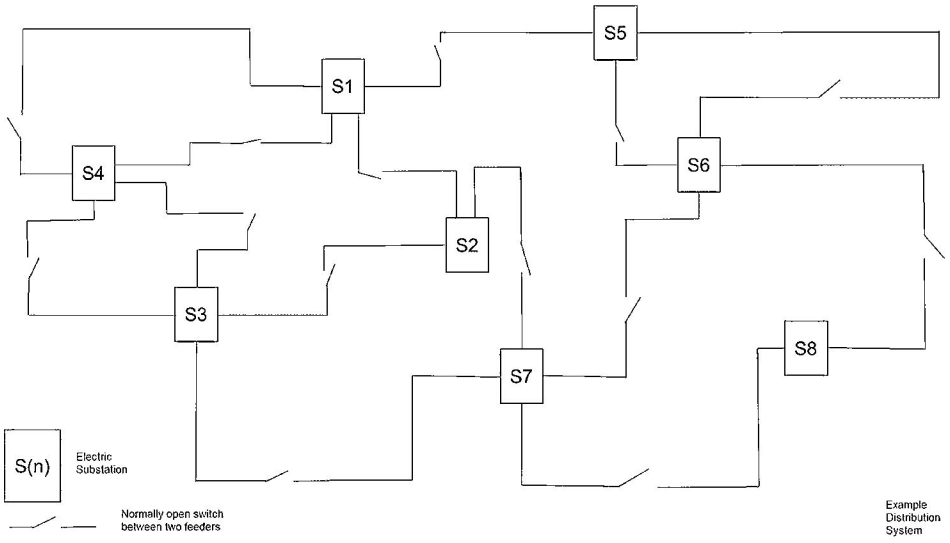

Figure 1.

Figure 1 shows how typical power systems connect substations and the feeders associated with each substation. Based on this example, if we have 10 customers on the feeders between substations S2 and S3 that will eventually convert to MHDVs, the initial consideration would be to upgrade these feeders. However, proactively examining the area

shows the feeders between S3 and S4 and S1 and S2 will also eventually need to be upgraded, which will eventually force each of the four substations to be upgraded. These projects are retrofit/upgrade and therefore likely to be much more costly than new infrastructure.

As an alternative, the utility should consider an approach illustrated in Figure 2 below:

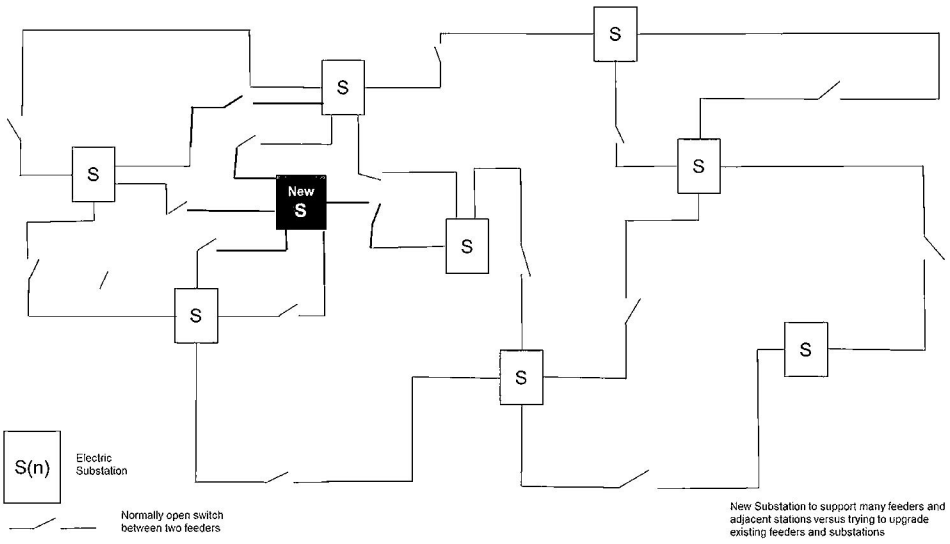

Figure 2.

In the above example, new transmission is extended, and a new substation is built. This new substation and its new feeders are then built to each existing feeder so that the loads on all feeders are reduced enough to be able to accommodate the new MHDV, and other future electric loads. This approach avoids costly feeder upgrades or substation retrofits.

Figure 3 below illustrates a similar approach to accommodate growth at the "edge" of the grid:

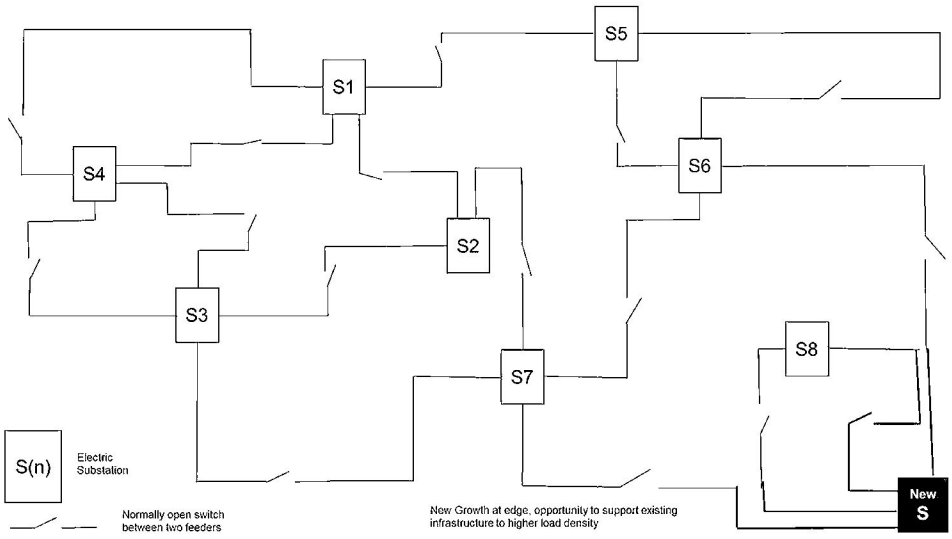

Figure 3.

Again, recognizing higher load density, new facilities can be constructed to both enable additional capacity expansion capacity on existing feeder and serve new expansion area of the system. The new load growth and addition of a new substation provides the opportunity for a utility to segment existing feeders to reduce load on them and pick this load up on the new substation and feeders. Each of these example approaches illustrates how anticipatory planning reduces the need for costly iterative facility retrofits.

Anticipatory planning, as contrasted with reactive system development, can also reduce the time needed to energize service to new customers. Additionally, in its last Regular Session, the Texas Legislature recognized the need for ERCOT to be more proactive in its approach to planning. As enacted by the Legislature, H.B. 5066 requires ERCOT to not limit planning to load with signed agreements to connect with the grid, but to also include

prospective load identified by transmission service providers.[22] Following the guidance of the Legislature, ERCOT has recognized that the need to be more proactive in planning on the transmission grid as ERCOT has become an imperative as it forecasts tremendous electric demand growth in the next five to seven years. In his CEO Update to the ERCOT Board of Directors at its meeting on April 23, 2024, Pablo Vegas discussed the need for a more proactive approach for transmission planning to address expected rapid load growth.[23] The growth of MDHV load presents a similar need for more proactive planning on the distribution grid as well, and CenterPoint should consider incorporating this same approach in its distribution system planning.

Q. WHY IS IT APPROPRIATE FOR UTILITIES TO INCORPORATE LONG-TERM PROJECTIONS OF ELECTRIC MHDVS IN THEIR FORWARD-LOOKING DISTRIBUTION SYSTEM PLANNING AND DEPLOYMENT?

A. The body of evidence supporting the electric MHDV trends I discuss above demonstrates a level of confidence that is more than adequate to inform utility system planning and specific recommendations are discussed below. While no forecast is perfect, these trends appear quite robust, and there is no reason to believe they will slow or reverse in the long term. Failure to incorporate such trends in utility planning practices will likely cause customer energization delays, higher overall system costs, and reduced customer benefits—the same issues on the transmission grid that the Legislature sought to address in H.B. 5066.

[22] T.X. H.B. No. 5066, Texas Eighty-Eighth Legislature (2023).
[23] Presentation, ERCOT Board of Directors Meeting, *Revised Board Update* (April 23, 2024), https://www.ercot.com/files/docs/2024/04/24/5%20CEO%20Update%20REVISED.pdf.

Q. SHOULD THIS UTILITY PLANNING ASSUME SIMULTANEOUS MHDV ELECTRIFICATION?

A. No. MHDV fleets will not electrify all at once. As EDF witness Xie discusses in his testimony, research suggests that significant load growth from MHDV electrification by 2030 will not be uniform across Texas or in the CenterPoint service territory.[24] Nor does it come from simultaneous MHDV electrification. Per Mr. Xie, transition to electric MHDVs will begin with first-mover segments of short- and regional-haul trucks like drayage trucks and urban delivery vehicles, and transit and school buses.[25] Mr. Xie testimony cites several large corporate fleets that have begun deployment of electric MHDVs or have announced plans to do so.[26] These large corporate fleets often have their dedicated depots for parking and dwelling at or near ports, warehouses and distribution centers, so the depot charging needs at those locations should be a near term priority for utility planning. This is an opportunity for utilities to proactively engage these companies to understand the scale and timeline of these transition plans to determine the needed distribution grid infrastructure investments. At the same time, Charging-as-a-Service (CaaS) providers are investing in public charging plazas to serve other fleet customers without dedicated depots or parking. There is also a need for utility planning to take the emerging public charging investments into consideration.

[24] Direct Testimony of Yihao Xie, at 6:2-11.
[25] *Id.* at 11:2-4.
[26] *Id.* at 6:7-11.

III. CENTERPOINT'S PLANNING AND INVESTMENT PROCESSES

Q. ARE YOUR ABOVE OBSERVATIONS RELEVANT TO CENTERPOINT?

A. Yes. First, as Mr. Xie discusses, by 2030, Harris County is likely to reach an MHDV peak charging load of 119 MW, reflecting aggregate nameplate capacity of 826 MW.[27] Moreover, CenterPoint's transportation electrification White Paper acknowledges incoming EV load growth and the need to prepare for a projected increase of 1.2 GW peak load by 2032.[28] Witnesses Easton and Harris further observe:

> Historically, distribution load increases have been driven primarily by new customer load interconnections, both residential and commercial. The increasing addition of electric vehicle charging will not only alter future load growth trends at a local level, but may also impact hourly load profiles compared to existing traditional customer loads. Load forecasts based on annual peak loading may no longer be sufficient to plan the distribution system. CenterPoint Houston is monitoring the increase in electrical vehicle charging and will incorporate community partner input in our ongoing assessment of whether, when, and how existing load forecasting and distribution planning processes need to be revised or augmented.[29]

Despite recognition of these issues, CenterPoint's filings in this proceeding suggest it has yet to take meaningful steps to incorporate them into its distribution system planning, including with respect to its investments through 2023, the rate year in this case. I will discuss this in further detail below.

Q. DOES CENTERPOINT INCORPORATE PROJECTED MHDV LOAD GROWTH AS PART OF ITS PLANNING PROCESS?

[27] *See* Near-term Infrastructure Deployment to Support Zero-Emission Medium- and Heavy-Duty Vehicles in the United States, 2023 (Exhibit YX-1, p. 3-5).
[28] *See* RFP02-01, CenterPoint Energy Mobility White Paper, 2022 (Exhibit YX-3, p. 29).
[29] CenterPoint's Response to EDF RFI02-05 (Exhibit CH-2, p. 5).

A. No. CenterPoint stated in discovery that it does not leverage EV growth data for distribution planning purposes. Rather, in its response to EDF's second request for information, CenterPoint states, "In the current process for selecting substations for distribution development plans and determining future substation loads to be studied in the distribution development plans, only new loads submitted as part of new service requests or service expansions are considered . . . ."[30]

Q. WILL CENTERPOINT'S CURRENT APPROACH FAIL TO RECOGNIZE AND PREPARE FOR SOME INCOMING NEW MHDV LOADS?

A. Almost certainly. As discussed above and in its White Paper, CenterPoint appears to be aware that these loads will continue to grow on its system.[31] The White Paper even includes a "heat map" of anticipated charging loads in CenterPoint's service territory.[32] Yet the MHDV data CenterPoint uses to inform its distribution development plans—i.e., only "new loads submitted as part of new service requests or service expansions"—are clearly inconsistent with these expectations. As a result, CenterPoint will almost certainly fail to capture reasonably foreseeable new MHDV loads in its regular forecasting and planning processes, which could result in consequences discussed earlier.

Q. WHAT ARE SOME STEPS CENTERPOINT SHOULD TAKE TO UPDATE ITS PLANNING PROCESSES?

[30] *Id.* at 4.
[31] *See* EDF RFP02-01, CenterPoint Energy eMobility White Paper, 2022 (Exhibit YX-3, p. 26).
[32] *Id.* at 35.

A. First, CenterPoint should incorporate projected MHDV loads, as informed by EPRI data, the National Zero-Emission Freight Corridor Strategy, academic literature, and other data sources as discussed by Mr. Xie, into its planning processes.[33] Such planning should align with the charging location and sequencing patterns described in Mr. Xie's testimony and in the National Zero-Emission Freight Corridor Strategy.

Second, CenterPoint should incorporate a process to update its load density expectations used in system planning. As discussed above, MHDV electrification (among other end-use electrification) will drive higher load densities in CenterPoint's service territory, which should affect its system planning and deployment in multiple ways:

(1) When planning and constructing new greenfield infrastructure, CenterPoint should incorporate updated load density expectations to create additional capacity across any new infrastructure to more effectively and efficiently serve new MHDV and other electrification initiative load in the future. This will effectively 'shorten' distribution feeder and increase the number of substations to provide this needed capacity in the future.

(2) When planning and constructing infrastructure at the edge of existing infrastructure, CenterPoint should incorporate updated load density expectations to create capacity in both the existing distribution system infrastructure adjacent to the new infrastructure as well as in the new infrastructure. For example, when a new substation is built, the feeders that are built to tie to existing feeders should assume some portion of the load of the existing feeders. In other words, the normally open point where the two feeders

[33] *See generally* National Zero-Emission Freight Corridor Strategy, 2024 (Exhibit YX-2).

tie together needs to be moved closer to the old, or existing, substation so that the feeder load is reduced to a level that creates the necessary growth capacity to serve MHDV and other electrification initiative load in the future. These impacts are illustrated in Figure 4 below:

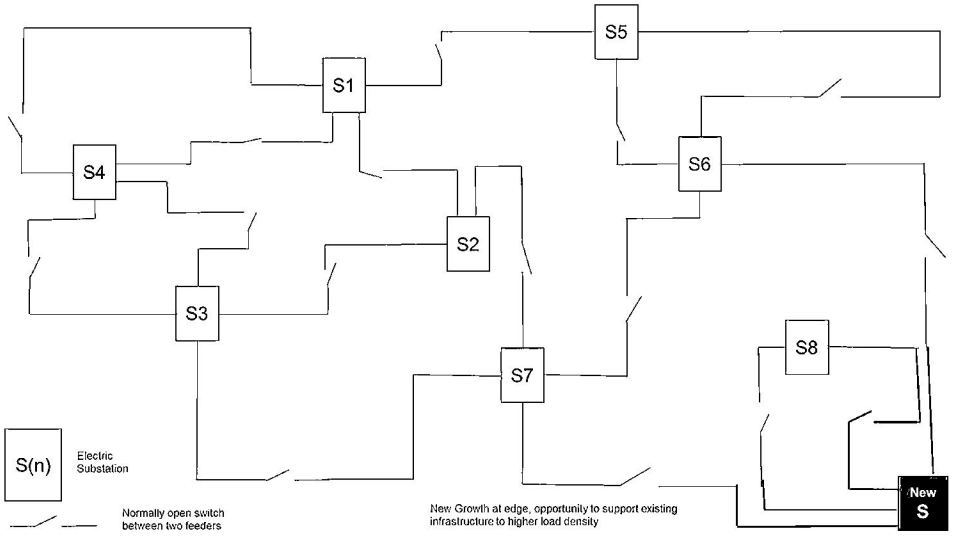

Figure 4.

(3) When planning and constructing infrastructure within areas of existing infrastructure, CenterPoint should incorporate updated load density expectations to increase the relative density of new substations and related equipment. Rather than wait for requests from customers, CenterPoint should proactively plan for MHDVs and other electrification initiative loads. By examining existing infrastructure with these new load criteria based upon known customer locations and eventual fleet conversions, CenterPoint can avoid an iterative, costly upgrade process and instead proactively build new, more cost-effective infrastructure to create additional capacity within the existing

grid by segmenting the existing infrastructure. These impacts are illustrated by Figure 5 below:

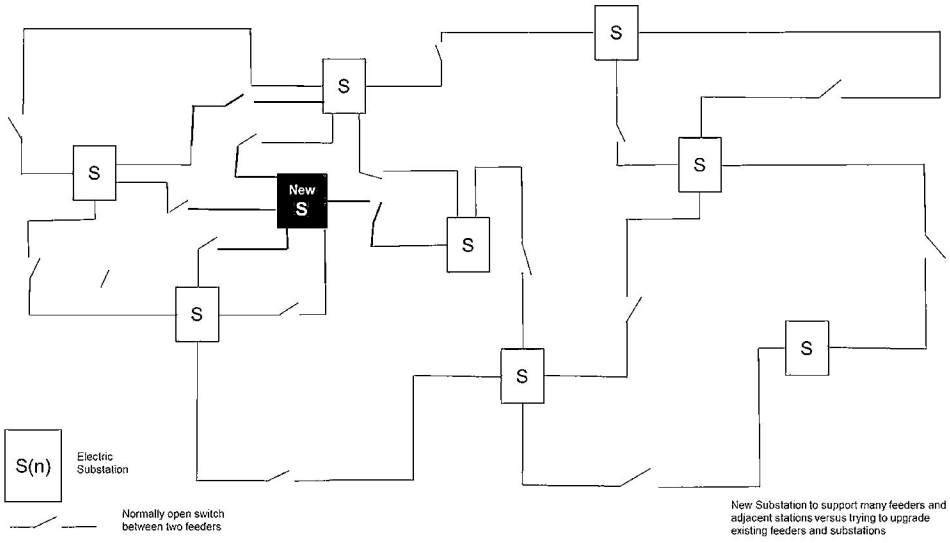

Figure 5.

MHDV (and other electrification initiatives) and DERs represent significant differences in how utilities have historically planned, and operated, the electric distribution system. Therefore, the overall planning process needs to adapt to this new reality. Above are specific examples that provide opportunities to plan and execute system capacity additions for long-term infrastructure. A more general view of an improved planning process that CenterPoint should consider is illustrated in the below diagram by LBNL:[34]

[34] *See supra* note 18.

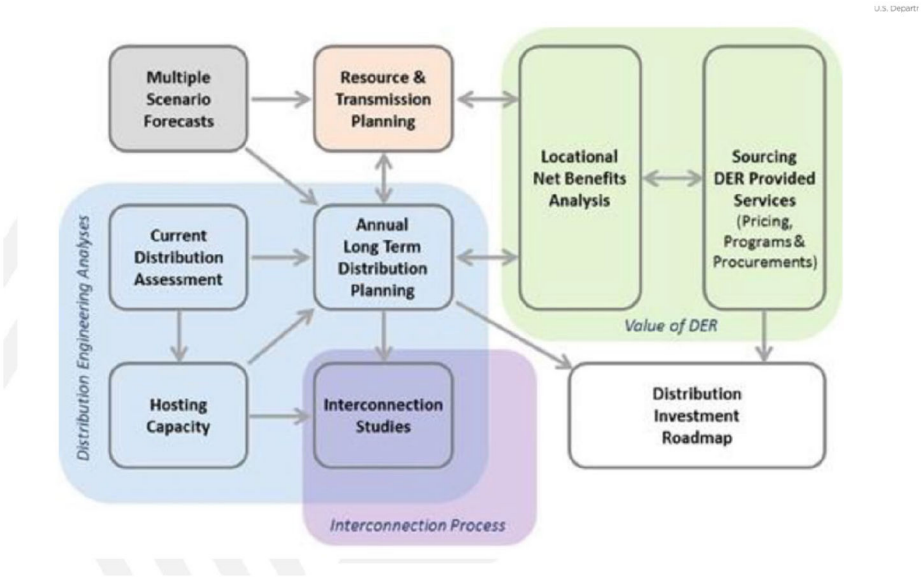

Figure 6.

This approach includes multiple scenario forecasts (which should reflect potential changes in predicted load densities), and accounts for the potential for DERs to provide net benefits to the system.

Q. DO YOU HAVE ADDITIONAL RECOMMENDATIONS?

A. Yes, as discussed below, I recommend CenterPoint: (1) Develop and publish hosting capacity maps; (2) Actively engage in the development and deployment of V2G capabilities; and (3) Clarify its rules regarding subtractive metering.

Q. WHAT IS A HOSTING CAPACITY MAP?

A. A hosting capacity map is a map that displays the ability of areas of an electric utility's system to accommodate additional loads and/or generation sources. Hosting capacity maps can take many forms, including differing levels of granularity, type of detail (e.g.,

showing import and/or export capacity) frequency of update, et cetera. Such maps are frequently made available to the public: the U.S. Department of Energy reports that "as of May 2024, 58 utilities and state agencies have published maps in 26 states, D.C., and Puerto Rico."[35]

Q. WHAT IS THE PURPOSE OF PUBLISHING A HOSTING CAPACITY MAP?

A. Hosting capacity maps provide transparency to help to inform decisions of prospective utility customers and other stakeholders. In a 2023 report discussing grid data sharing, including through hosting capacity maps, the National Association of Regulatory Utility Commissioners (NARUC) observed:

> Fundamental to optimizing the design and operations of the electricity distribution system and its components is a shared understanding of the system itself. The data needed to fully understand distribution system limitations and potential are commonly held within the utility. DER developers, particularly, seek access to grid data to influence their siting and programming decisions.[36]

Furthermore, per the Department of Energy:

> The transition to a more sustainable transportation system—including the widespread adoption of electric vehicles (EVs)—will put new and increased demands on our nation's electricity grids. Electric utilities working to expand their capacity to meet America's future energy needs use hosting capacity maps to provide an overview of a distribution system's ability to host additional electrical capacity (either generation or load) at specific grid locations.

[35] U.S. Office of Energy Efficiency and Renewable Energy, *U.S., Atlas of Electric Distribution System Hosting Capacity Maps*, https://www.energy.gov/eere/us-atlas-electric-distribution-system-hosting-capacity-maps.
[36] LYNN CONSTANTINI ET AL., GRID DATA SHARING: SUMMARY OF CURRENT STATE PRACTICES: A PUBLICATION OF THE NARUC GRID SHARING COLLABORATIVE 1-4 (NARUC 2023).

> Hosting capacity maps provide greater transparency into the ability of a distribution grid to host additional distributed energy resources (DERs), and including new loads including EV charging. In addition, hosting capacity maps can identify where DERs can alleviate or aggravate grid constraints. Utilities, developers, and other stakeholders can use hosting capacity maps for better planning and siting and they can help businesses like EV charging companies identify where there is available capacity on the electric grid to connect new loads.
>
> While hosting capacity maps do not address site-specific interconnection questions, they can provide a general understanding of a specific network's capacity to accommodate new DERs and some utilities have begun collaborating to provide comprehensive maps covering multiple service territories. And even if a utility does not offer a publicly available hosting capacity map, they may be able to consult with new and existing customers on their distribution network's future capacity potential.[37]

As of June 2024, EPRI has also begun to incorporate distribution hosting capacity maps as a data layer into its eRoadMAP tool, which identifies projected EV charging load "hot spots" and which CenterPoint is "evaluat[ing]" for use in future load forecasts and system planning.[38]

The transparency afforded by hosting capacity maps can benefit utilities in addition to customers. For example, they can help prospective customers identify locations where the grid is prepared to accommodate their service—allowing the utility to attract incremental throughput without incurring significant incremental capital costs. A utility's operation of a hosting capacity map thus helps to inform its capital expenditures and its revenues.

[37] U.S. Office of Energy Efficiency and Renewable Energy, *supra* note 39.
[38] CenterPoint's Response to EDF RFP02-01, (Exhibit YX-3, p. 19); *See also* EPRI ERoadMAP, *supra* note 11.

Q. DOES CENTERPOINT PUBLISH A HOSTING CAPACITY MAP FOR ITS DISTRIBUTION OR TRANSMISSION SYSTEMS?

A. No. The Company stated:

> Currently, CenterPoint Energy is not actively pursuing development of a hosting capacity map. However, the Company does offer a pre-screen in lieu of a hosting capacity map to any prospective customers that would like to interconnect to the distribution system. This allows the Company to determine the relevant high-level details needed depending on the type of resource that is choosing to interconnect to perform targetted [sic] assessment. CenterPoint uses this method as a more accurate way of giving prospective customers the information they are seeking.[39]

Q. WHAT DO YOU RECOMMEND WITH RESPECT TO HOSTING CAPACITY MAPS?

A. CenterPoint should develop and publish separate hosting capacity maps for its transmission and distribution systems. The transmission map would be intended for very large loads, perhaps 10MW or larger, that may require transmission-voltage service (i.e., at 60 kV or higher.[40] The distribution map would be intended for other customers. The maps should include, at a minimum, the following information by location, circuit, and/or substation:

1) Operating voltage (kilovolt);
2) Available hosting capacity for each type of generation and load (MW);
3) Total nameplate interconnected generation, including distributed generation (MW);
4) Total nameplate pending generation, including distributed generation (MW);
5) The date last updated.

[39] *See* CenterPoint's Response to EDF RFI01-03 (Exhibit CH-2, p.7).
[40] Direct Testimony of David Mercado, at 23:1-7.

CenterPoint should update this information at least semiannually and should also make the data available via an application programming interface (API) for easy import to other geographic information systems (GIS), including EPRI's eRoadMAP.

Q. WHAT DO YOU RECOMMEND WITH RESPECT TO V2G?

A. CenterPoint should continue to explore the positive impacts that V2G can have on the electric grid moving forward. Specifically, I would recommend effective coordination between distribution operations and customer 'fleet charging management systems.' Currently, many new fleet charging management solutions are being created and implemented as fleets are converted to electric, and CenterPoint can proactively work with these customers and systems to minimize any negative impacts and also potentially create positive resource impacts for the grid at critical times. Second, I would encourage CenterPoint to explore programs to incent, or require under certain circumstances, customer EV charging equipment to be V2G-capable.

Q. WHAT IS SUBTRACTIVE METERING?

A. Subtractive metering refers to an arrangement that allows two or more loads to be served by a single service while being metered and billed separately. In this arrangement, one meter (the "parent" or "house" meter) is located near the point of service and registers all consumption at the premises. Further downstream from that point, one or more "child" meters register consumption of specific loads on the premises, such as EV charging

stations. The utility's billing system then subtracts the "child" meters' loads from the "parent" meter's load to have the opportunity separate those loads for billing purposes. Separate metering of loads can be particularly appealing to customers with MHDV charging stations for a few reasons. Separating MHDV charging loads from parent loads can enable customers to shop for different supply products tailored to those loads' respective characteristics. It can enable MHDV loads to be billed on a different rate class than the parent load, which may afford customer savings and effective participation in future V2G utility programs or market products. Separate metering also provides the customer with greater information regarding their MHDV charging costs. It also provides the utility with improved insight into the load characteristics of the MHDV chargers, which can help inform system planning and operations, and again, may help support future demand-response or V2G capabilities of the MHDVs.

Subtractive metering can accomplish separate metering without the need for multiple service lines. It therefore reduces costs for both the customer (e.g., by avoiding trenching and other work on the customer's side of the meter needed to accommodate additional service(s)) and the utility (e.g., by avoiding the costs of multiple services).

Q. DOES CENTERPOINT CURRENTLY OFFER SUBTRACTIVE METERING?

A. Yes; however, it is not clear whether its current rules permit subtractive metering on a *single* customer's premises. CenterPoint's retail tariff provides for two *different* customers to enter a subtractive metering arrangement, under which one customer would effectively take service via the other customer. CenterPoint's tariff does not appear to include

corresponding rules that would apply to a single customer seeking to separately meter multiple loads on their premises.[41]

Q. WHAT DO YOU RECOMMEND WITH RESPECT TO SUBTRACTIVE METERING?

A. To the extent it does not already do so, CenterPoint should offer subtractive metering to customers seeking to separately meter multiple loads on their own premises. It should also clarify the availability of this option, including by express discussion throughout its retail tariff. This tariff should describe subtractive metering process and requirements akin to the applicable ones in its current rule 6.3.4.2; however, single-participant subtractive metering customers should not be subject to an additional fee, such as the $290 monthly fee rule 6.3.4.2 paragraph (2) levies on multi-customer subtractive metering arrangements. While this construct may be logical for a second consumer taking service behind another customer's parent meter, it does not make sense when applied to a single-participant submetering customer. In this case, the customer should not be subject to an additional fee considering the benefits the utility can realize through the subtractive metering arrangement (e.g., avoided service extension costs, increased load visibility, future participation in proactive V2G or other programs, etc.).

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

[41] *See* CenterPoint Retail Service Tariff Sec. 6.3.4.2 (Exhibit CH-3).

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§ § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

Exhibit CH-1

Southern California Edison Unit Cost Guide (March 2019)

Southern California Edison Unit Cost Guide dated March 30, 2019
In accordance with Attachment A to Decision D16-06-052, the Unit Cost Guide represents facilities generally required for interconnection. Unit Cost Guide is not binding for actual facility costs and is provided only for additional cost transparency and developer reference. For reference, Ft = Per Foot

Category 1 - 12/16kV 480 volt transformer - includes 100' Sec. cable length

Item #	Equipment	Unit Cost	Notes
1			
2	300kva & Sec. Cable	$36,000	
3	500kva & Sec. Cable	$46,000	
4	750kva & Sec. Cable	$53,000	
5	1000kva & Sec. Cable	$68,000	
6	1500kva, Sec. Cable & fuse cabinet	$94,000	
7	2500kva, Sec. Cable & fuse cabinet (Fuseing); Used with an External Fuse Cabinet	$178,000	

Category 2 - Overhead to Underground (UG)- Set Pole and make up Cable

#	Equipment	Unit Cost	Notes
1	Pri 1/0 Cable from New Pole 200'	$31,000	
2	Pri 350 Cable from New Pole 200'	$35,000	
3	Pri 1000 Cable from New Pole 200'	$41,000	

Category 3 - Overhead (OH) Service

#	Equipment	Unit Cost	Notes
1	OH Primary Service	$16,000	
2	New Conductor Extension from POI to PCC	$120/ft	

Category 4 - Underground to Underground - Cable with Terminators

#	Equipment	Unit Cost	Notes
1	Pri Low Ampacity Cable undg feed 400'	$16,000	1/O XLP
2	Pri High Ampacity Cable undg feed 400'	$35,000	350XLP
3	Pri High Ampacity Cable undg feed 400'	$37,000	1000XLP
4			
5			
6			
7	New underground cable and connections (ft)	$25/ft	1/O XLP
8	New underground cable and connections (ft)	$50/ft	350XLP - 1000XLP

Category 5 - Metering

#	Equipment	Unit Cost	Notes
1	Secondary Metering	$5,300	
2	12KV/16KV - 50/400 Amp Demand	$15,000	
3	33kV Pole Top Mtrg - Transformer rack configuration	$110,000	
4	Single Phase, self-contained meter (600 V)	$1,100	

	Southern California Edison Unit Cost Guide dated March 30, 2019 **In accordance with Attachment A to Decision D16-06-052, the Unit Cost Guide represents facilities generally required for interconnection. Unit Cost Guide is not binding for actual facility costs and is provided only for additional cost transparency and developer reference. For reference, Ft = Per Foot**		
5	Transformer-rated meter (600 V)	$6,000	3000/5 CT
6	Primary Transformer-rated meter (5 kV)	$12,000	4 kV Meter
7	Primary Transformer-rated meter (15 kV)	$13,000	Indoor type
8	Primary Transformer-rated meter (25 kV) - Existing single pole	$48,000	33 kV pole mounted
	Category 6 - Telemetry		
#	**Equipment**	**Unit Cost**	**Notes**
1	33kV Automatic Recloser	$135,000	Used for Interconnection switch and not used for telemetry
2	12/16kV-Gas switch with Automation	$57,000	Used for Interconnection switch and not used for telemetry
3	Centralized Remote Terminal Unit	$6,100	0.99 MVA-9.99 MVA
4	Dedicated Remote Terminal Unit	$144,000	Greater than 9.9 MVA
5	Bi-directional watt transducer	$50,000	
6	Data Point addition and existing HMI	$9,500	
7			
	Category 7 - System Equipment		
#	**Equipment**	**Unit Cost**	**Notes**
1	12 & 16kv Omni Pole Switch (switch itself and handle)	$13,500	
2	Padmounted Gas Switch (without SCADA)	$50,000	
3	12/16kV 1200 KVAR Capacitor Bank & Pole	$33,000	
4	12/16KV 1200 KVAR Capacitor Bank on Pad	$56,000	
5	12/16kV regulator 3-228s	$185,000	
6	33kV Regulator 3-690/722	$282,000	
7			
8	Pole Mounted 12kV Grd detector	$31,000	Average of Padmount and Overhead
9	Ground Bank	$61,000	Average of small and large
10	Reconductor (Per ft) - OH - Urban	$180/ft	
11	Reconductor (Per ft) - OH - Rural	$130/ft	
12	Reconductor (Per ft) - UG	$80/ft	

	Southern California Edison Unit Cost Guide dated March 30, 2019 In accordance with Attachment A to Decision D16-06-052, the Unit Cost Guide represents facilities generally required for interconnection. Unit Cost Guide is not binding for actual facility costs and is provided only for additional cost transparency and developer reference. For reference, Ft = Per Foot		
13			
14			
15	Overhead Fuse Replacement	$3,500	
16			
17	Relocate Capacitor Bank	$19,000	
18			
19	Relocate Voltage Regulator	$44,000	
20			
21			
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Note: For overall IOU line consistency, facilities not commonly used for SCE interconnection have been placed in gray.

Southern California Edison Unit Cost Table - September 21, 2019 - Acronym Table

Acronym	Description	IOU (if used)
ITCC	Income Tax Component of Construction	All
CICA	Contributions is Aid of Construction	All
IF	Interconnection Facilities	All
PCC	Point of Common Coupling	All
POI	Point of Interconnection	All
ESR	Electrical Service Requirements	SCE
UG	Under Ground	All
OH, OVH	Over Head	All
DER	Distributed Energy Resource	All
DG	Distributed Generation	All
IC	Interconnection Customer	All
SLD	Single Line Diagram	All
ROW	Right of Way	All
BLM	Bureau of Land Management	All
AFUCD	Allowance of Funds Used During Construction	SDGE
CNF	Cleveland National Forest	SDGE
SCADA	Supervisory Control and Data Acquisition	All
RTU	Remote Terminal Unit	All
GS	Gas Switch	All
PME	Pad Mount Equipment	All
COO	Cost of Ownership	PGE

Southern California Edison Cost Table Assumptions

General labor overtime: based on 6-10 work schedule.
General contingency factor: 35% - SCE Standard Contingency Policy used for preliminary project estimating based on AACE guidelines.
Unit cost guide assumes facilities are constructed under an Engineer, Procurement and Construction (EPC) agreement. All facilities are owned by SCE.
Unit costs exclude generator's responsibility for Income Tax Component of Contribution (ITCC), (these will be added to total cost estimates, if required) along with O&M Replacement (both discussed under example assumptions)
Unit costs exclude environmental monitoring, licensing and mitigations.
Unit cost are given w/out the benefit of any preliminary & final engineering. Unforeseen conflicts and/or scope will increase costs. These unit costs do not include: right-of-way & easements requirements, environmental engineering/mitigation, GO 131-D engineering /permitting, other permitting, associated SCE/3rd Party under-build work, etc. A signed Interconnection Agreement is required before final design/engineering can start. Construction will not commence until all of the above conditions have been addressed.
Unit costs do not include the construction of UG ducts and structures (civil construction).

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Southern California Edison Unit Cost Guide Variability Illustrative Discussion

The impacts identified below are only examples of items based upon historic experience. While effort has been made to include numerous examples, this list is not meant to be viewed as all inclusive and is for illustrative purposes only. Impacts are not always know in advance and final estimates are driven by project specific conditions as reviewed during the system review process.

Examples of Potential Factors Effecting Rule 21 Estimated or Actual Costs

1	**3rd Party or Multi-Party Easements** Example: Roof top solar project on leased building. Significant added coordination to obtain easements. Leasing tenant and/or developer failed to engage building owner of need for interconnection facilities in advance of proceeding with project. This issue is compounded when the site plans and drawings provided do not include surveyed property lines. Even with approval, 3rd party easements require additional document preparation, review and processing.
2	**City Restrictions** Example: Traffic control in a school area limited work to 9:00 AM to 2:00, doubled project duration (days) of project, impacted efficiency and doubled traffic control and number of resource mobilizations (Road moratorium, customer research)
3	**Local Jurisdiction Improvements** Example: Long term city plan for road widening. Required existing pole to be set back to get jurisdictional permits. Critical that customer communicate plans with city well in advance to determine required upgrades or improvements.
4	**Outage Coordination** Utilities make best efforts to balance impacts to all customer when taking outages. Multiple customer needs must be considered. While there is obligation to get service connected impact to existing customer(s) must be considered.
5	**Pole Height Restrictions** Deteriorated pole condition requires a replacement. Under build requires pole change and taller pole is restricted by view or other issues. Local airport restrictions on pole height.
6	**Underground Impairments & Structure Limits** Errors in customer base map for underground. Mapping can not forecast underground structure volume available for new facilities. Overcrowded structures can be an issue.
7	**Undisturbed Grounds** Customer environmental survey work does not take into account potential utility work.
8	**Customer Base Map Quality** Low quality customer base maps requiring field visits, surveying and multiple back and forth communication to get correct details. Often causes months of delay to project construction.
9	**Neighboring Customer Impacts** Customer on circuit with seasonal operation would be excessively impacted by outage. Circuit with high level of critical care customers. Generator required to support outage. Construction anticipated in winter months or during storm season.
10	**Topology** What appeared to be "drainage channel" was classified as waterway and required long span crossing
11	**Customer Civil Work** A high number or projects see delays in start and completion of customer civil work that extends project duration and can result in added crew trips to site for re-starts. Heavily impacts crew scheduling.
12	**Requested Project Timing** Construction anticipated in winter months or during storm season.

Project Examples - Southern California Edison Unit Cost Table; examples provided below are for illustrative purposes only and are not binding for actual facility costs

Scenarios < 1MW:

Scenario 1

	Unit	Quantity	Cost ($)	Category	*Supporting Comments*
Interconnection Facilities					
500 kVA trans /cable	EA	1	$44,000	(1)	
480V metering	EA	1	$5,000	(5)	This is a 0.380 MW, 480V solar generator interconnecting to an OH service located on a low DG penetration 12 kV circuit. Based on the size of the project, standard Interconnection Facilities are required: new riser pole, primary cable, new padmount transformer secondary metering cable. The main feeder did not require any Distribution Upgrades.
Riser w/cable	EA	1	$30,000	(2)	
		Project Total:	$79,000		
Tax Component (if applied/see assumption 1)			$27,650		
Monthly Interconnection Facilities Charge (see assumption 2/Replacement with Additional Cost)			$300		

Scenario 2

	Unit	Quantity	Cost ($)	Category	
Interconnection Facilities					
750 kVA w/cable	EA	1	$51,000	(1)	
Ground Detector	EA	1	$30,000	(7)	This is a 0.675 MW, 480V induction generator interconnecting to an existing underground service located on a low DG penetration 12 kV circuit. Based on the size of the project, standard Interconnection Facilities are required: primary cable, new padmount transformer, padmount ground detector and secondary metering and cable. The main feeder did not require any Distribution Upgrades.
1/0 Primary cable	FT	400	$34,000	(4)	
480V meter	EA	1	$5,000	(5)	
		Total	$120,000		
Tax Component (if applied/see assumption 1)			$42,000		
Monthly Interconnection Facilities Charge (see assumption 2/20 Year Replacement and No Additional Cost)			$480		

Scenarios ≥ 1MW:

Scenario 3

	Unit	Quantity	Cost ($)	Category	
Interconnection Facilities					
Pad G.S. w/automation	EA	1	$56,000	(6)	
1500 kVA w/cable	EA	1	$92,000	(1)	This is a 1.5 MW, 480V solar generator interconnecting downstream of an existing Automatic Recloser on a 12 kV circuit. Based on the size of the project, standard Interconnection Facilities are required: riser pole, primary cable, padmount gas switch, padmount PME switch, padmount transformer, secondary metering and cable. Since this project is ≥ 1 MW but <10MW telemetry is required. In addition, the solar project triggers a high voltage condition on the circuit. As a result, a Voltage Regulator is install to mitigate the high voltage condition.
PME-5 w/cable	EA	1	$26,000	(7)	
480V meter	EA	1	$5,000	(5)	
Riser w/cable	EA	1	$30,000	(2)	
Centralized RTU	EA	1	$6,100	(6)	
		Total	$215,100		
Distribution Upgrades					
Voltage Regulator	EA	1	$180,000	(7)	
		Total	$180,000		

Scenario 4

	Unit	Quantity	Cost ($)	Category	
Interconnection Facilities					
Pad G.S. w/auto	EA	1	$56,000	(6)	
350 Cable	EA	1	$34,000	(2)	This is a 2.0 MW, 12 kV solar project interconnecting to an existing underground service located on a high penetration DG, 12 kV circuit. Based on the size of the project, standard Interconnection Facilities are required. Primary cable, padmount gas switch, Remote Control Switch for automation, an primary metering. The addition of the generator triggered a thermal overload on the feeder. Thus, a line reconductoring is necessary to alleviate the thermal overload.
12 kV meter	EA	1	$14,000	(5)	
Centralized RTU	EA	1	$6,100	(6)	
		Total	$110,100		

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	Unit	Quantity	Cost ($)	Category	
Distribution Upgrades					
Reconductor 1500 of OH to 336 ACSR	EA	1	$195,000	(7)	
		Total	$195,000		

Scenario 5

	Unit	Quantity	Cost ($)	Category	
Interconnection Facilities					
Pad G.S. w/auto	EA	1	$56,000	(6)	
1/0 Primary cable	EA	1	$15,000	(4)	This is a 3.0 MW, 16 kV solar generator interconnecting at the end of the line on an existing overhead service. Base on the size of the project new Interconnection Facilities are triggered: riser pole, primary cable, padmount gas switch, Remote Control Switch for automation, primary metering and associated wiring and telemetry. The addition of the generator triggers the installation of an Automatic Recloser to detect end of line faults. It also triggers reverse power flow back (MW/MVAR) at the SCE substation. As a result, a transducer and data point addition to an existing RTU is required to monitor watts and reactive power.
16 kV meter	EA	1	$14,000	(5)	
Centralized RTU	EA	1	$6,100	(6)	
		Total	$91,100		
Distribution Upgrades					
Remote Automatic Recloser	EA	1	$96,000	(6)	
Bi-directional Watt transducer	EA	1	$49,300	(6)	
Data point addition to HMI	EA	1	$9,500		
		Total	$154,800		

Project Examples - Southern California Edison Unit Cost Table; examples provided below are for illustrative purposes only and are not binding for actual facility costs

Scenario 6

Interconnection Facilities					
Pad G.S. w/auto	EA	1	$56,000	(6)	This is a >1 MW, 16 kV synchronous generator interconnecting to an existing overhead service. Based on the size of the project, standard Interconnection Facilities are required: riser pole, padmount gas switch, Remote Control Switch for automation, ground detector and primary metering. The ground bank would be dependent on the grounding configuration of the Generating Facility. If the step transformer is connected Delta/Y-grounded (Delta on the gen side), then the ground bank would not be required.
Ground Bank	EA	1	$63,000	(7)	
Riser w/cable	EA	1	$40,000	(2)	
16 kV meter	EA	1	$14,000	(5)	
Centralized RTU	EA	1	$6,100	(6)	
		Total	$179,100		

Scenario 7

Interconnection Facilities					This is >10 MW, 33 kV solar generator interconnecting to an existing overhead service. Based on the size of the project, new Interconnection Facilities are required: pole line extension, Automatic Recloser and 33 kV poletop metering and a Dedicated Remote Terminal Unit. The main feeder experience a high voltage condition and a line recoductor is required to mitigate the voltage.
33 kV RAR	EA	1	$131,000	(6)	
9000' 336 ACSR	EA	1	$1,170,000	(7)	
33 kV OH meter	EA	1	$108,000	(5)	
Dedicated RTU	EA	1	$140,000	(6)	
		Total	$1,549,000		
Distribution Upgrades					
1000' of 4/0 to 750 cable upgrade	EA	1	$30,000	(7)	
		Total	$30,000		

EXAMPLE DEVELOPMENT ASSUMPTIONS:

1. ITCC (Income Tax Component of the Contribution): For purposes of the example assumptions, the ITCC rate is assumed to be at 35% (based upon standard depreciation)
2. The Interconnection Facilities Charge (O&M) is determined in accordance with GRC Authorization Provided in Rule 2.H (2015 Southern California Edison General Rate Case, 15-11-021 authorized rate from January 1, 2016). Please note that the rate is subject to change based on future filings. For the Interconnection Facilities Charge Replacement Options, Interconnection Applicant would pay the following as provided in Examples 1 and 2: Customer Financed with Replacement at Additional Cost = 0.38%, With Replacement for 20 yrs at No Additional Cost = 0.40%
3. Removal Costs are case dependent and determined based upon actual costs and are not prepared utilizing a proxy percentage.
4. ITCC and Interconnection Facilities Charge are reflected in examples 1 and 2; same methodology can be utilized in other shown examples.

SCE Escalation Factor - Unit Cost Guide

ESCALATION OVERVIEW :

Current SCE Unit Cost Guide Escalation Factors (consistent with CAISO) is in 2019 Constant Dollars.

SCE's cost estimating is done in 2019 constant dollars and then escalated over the years during which the project will be constructed, arriving at project costs in 2016 Constant Dollars Escalated to OD Year.

Current escalation rates used to arrive at escalated dollars are derived as follows:

► 2015-2025 - Q3 2015 IHS Global Insight Forecast of Transmission Capital escalation for the Pacific region (JUEPT@PCF)

DEFINITIONS :

Project Cost in 2019 Constant Dollars represents the cost of the Project if all costs were paid for in 2019.

Project Cost Escalated to OD Year represents the cost of the Project if all costs were paid for in the OD Year.

Mathematical formula: Constant Dollars Escalated to OD Year = Cost in Constant Dollars x Escalation Factor to OD year

CURRENT SCE ESCALATION RATES :

	2019	2020	2021	2022	2023	2024
Escalation Rate	2.72%	2.44%	2.35%	2.08%	2.21%	2.19%
Escalation Factors	1.0000	1.0244	1.0485	1.0703	1.0940	1.1179

Factors listed above consistent with CAISO unit cost guide.

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SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§**	**PUBLIC UTILITY COMMISSION OF TEXAS**

Exhibit CH-2

CenterPoint's Responses to EDF's RFI02-01, 04-05; RFI03-3

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-01

QUESTION:

Refer to CenterPoint's Response to EDF RFI 1-1: " . . . CenterPoint Energy has invested in research studies and web based tools to anticipate EV conversion." Please explain how these studies inform CenterPoint's:

a. Load forecasting;
b. Distribution planning and/or distribution infrastructure deployment efforts.

ANSWER:

a. Currently, EV impact on load forecasting is determined based on new service requests submitted by customers. In the future, CenterPoint Energy plans to leverage findings from research studies and web-based tools to estimate future EV growth. The Company is continuing to evaluate how this data will be used in load forecasting.
b. See response to a. The Company is evaluating how future trends of EV loads can be leveraged to improve distribution planning and/or distribution infrastructure deployment efforts.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-04

QUESTION:

Refer to CenterPoint's Response to EDF RFI 1-5: "Currently, for the purpose of estimating EV load growth in the Distribution Development Plan, electrification impacts from EVs are only considered for commercial EV loads that have been submitted by customers as service additions or service expansions." Please reconcile this response with CenterPoint's Response to EDF RFI 1-2: "The Company is also working to leverage forecasts for the studies . . . to determine areas that create potential constraints and implement proactive measures."

ANSWER:

In the current process for selecting substations for distribution development plans and determining future substation loads to be studied in the distribution development plans, only new loads submitted as part of new service requests or service expansions are considered. The EV forecast and research study efforts mentioned in prior responses were undertaken to understand potential future impacts from EV penetration. After completion of these studies, the results will be evaluated to see how future load forecast and distribution development plan procedures may need to be modified.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI02-05

QUESTION:

Refer to CenterPoint's Response to EDF RFP01-01(d), at Bates page 160: ". . . Equitable access to the benefits of electric transportation will only be achieved once all of the factors on page 19 are addressed. And because some of these accessibility issues are only loosely within CNP's control, **the importance of community partners participation is paramount."** (Empasis added.) With respect to its transportation electrification activities, including related distribution system planning and deployment, please explain how CenterPoint:

a. Identifies community partners;
b. Solicits community partner participation;
c. Incorporates community partner input.

ANSWER:

a. CenterPoint identifies community partners through a number of means, such as:
    a. Ongoing engagement with Evolve Houston, a Houston-based nonprofit that supports local companies in their electrification efforts;
    b. Companies that have expressed, primarily through Evolve Houston, their interest in electrification to meet their ESG and/or Net Zero goals;
    c. Relationships with local governments and special districts interested in developing electrical infrastructure, such as the City of Houston and their Tax Increment Reinvestment Zones (TIRZ); and
    d. CenterPoint's Customer Advisory Councils.
b. When a community partner is identified or engages CenterPoint, the Electrification team requests information about the short- and long-term electrification plans for the partner and utilizes the information gathered to understand better the broader impacts that these plans may have on overall loads.
c. A heat map, which can be found in the West Monroe whitepaper (see page 19 of 29 in 'EDF-RFP02-01 CNP_EV_whitepaper WM.pdf' in response to EDF RFP 02-01), is one example of how CenterPoint Houston incorporates aggregated information regarding Fleet Conversion charging efforts.

    In addition, the CenterPoint Energy Electrification Team incorporates input from community partners, such as those identified in our response to EDF RFI 02-05a, to identify and target future customer MHDV Charging infrastructure and elicit feedback with regard to timing and expected load requirements. As stated in Testimony by Rina Harris (*Page 10, Lines 10-20*), as MHDV charging infrastructure is expected to cluster in specific geographic areas, leveraging input from customers, trade organizations, and research institutes will provide focus for future customer engagement opportunities.

    Historically, distribution load increases have been driven primarily by new customer load interconnections, both residential and commercial. The increasing addition of electric vehicle charging will not only alter future load growth trends at a local level, but may also impact hourly load profiles compared to existing traditional customer loads. Load forecasts based on annual peak loading may no longer be sufficient to plan the distribution system. CenterPoint Houston is monitoring the increase in electrical vehicle charging and will incorporate community partner input in our ongoing assessment of whether, when, and how existing load forecasting and distribution planning processes need to be revised or augmented.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 56211
SOAH DOCKET NO. 473-24-13232

ENVIRONMENTAL DEFENSE FUND
REQUEST NO.: EDF-RFI03-03

QUESTION:

Please summarize CenterPoint' s efforts to develop a system, such as a hosting capacity map, to provide current and prospective customers with granular (e.g., distribution feeder-specific) data regarding the generation and/or load hosting capacity of CenterPoint' s distribution assets. To the extent CenterPoint is not planning to deploy such a system, please explain why not. To the extent CenterPoint is planning to deploy (or has deployed) such a system, please identify (i) anticipated system deployment date; (ii) anticipated system functionalities, including level of data granularity and frequency of data updates; (iii) anticipated software and hardware requirements of such system; and (iv) anticipated system costs, including any such costs claimed in this proceeding.

ANSWER:

Currently, CenterPoint Energy is not actively pursuing development of a hosting capacity map. However, the Company does offer a pre-screen in lieu of a hosting capacity map to any prospective customers that would like to interconnect to the distribution system. This allows the Company to determine the relevant high-level details needed depending on the type of resource that is choosing to interconnect to perform targetted assessment. CenterPoint uses this method as a more accurate way of giving prospective customers the information they are seeking.

SPONSOR:
Rina Harris / Eric Easton

RESPONSIVE DOCUMENTS:
None

SOAH DOCKET NO. 473-24-13232
PUC DOCKET NO. 56211

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR AUTHORITY TO CHANGE RATES	**§ § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

Exhibit CH-3

CenterPoint Retail Tariff Sec. 6.3.4.2

6.3.4.2 AGREEMENT FOR SUBTRACTIVE METERING – DISTRIBUTION VOLTAGE

ACCOUNT NO. A_____ **ACCOUNT NO. B**_____
SERVICE ADDRESS A: _____ **SERVICE ADDRESS B:** _____
_____ _____

This agreement is entered into by and between _____, herein called "Retail Customer A".

and

_____ , herein called "Retail Customer B", and CenterPoint Energy Houston Electric, LLC, herein called "Company", as follows:

1. Retail Customer A will provide all necessary switch gear and protective equipment necessary to receive and use electric power delivery service from Company's distribution voltage lines. This equipment is hereinafter referred to as "Distribution Panel". Retail Customer B, whose service arrangement requires that they also provide the facilities necessary to receive service from Company's distribution voltage lines, has agreed to take electric power delivery service from Company. Retail Customer B will own and operate one or more electrical installationslocated on or near the property of Retail Customer A. Retail Customer B desires to receive electric power delivery service for its electrical installations from Company's distribution voltage lines through Retail Customer A's Distribution Panel and Retail Customer A is willing to allow Retail Customer B to receive electrical power distribution service for Retail Customer B's electrical installations through Retail Customer A's Distribution Panel. Retail Customer B agrees that if it has more than one electrical installation covered by this agreement, each installation ("Retail Customer B Installation") will, if required by Company, be separately metered and have its own ESI ID.

2. Company agrees to provide electric power delivery service to Retail Customer A in accordance with Rate _____ as supplemented herein, and in consideration of Company so doing, Retail Customer A agrees that charges made in accordance with the "Monthly Rate" section of its respective Rate Schedule will be increased by $290.00 per month per meter.

3. Company agrees to provide electric power delivery service to Retail Customer B in accordance with Rate _____ as supplemented herein, and in consideration of Company so doing, Retail Customer B agrees that charges made in accordance with the "Monthly Rate" section of its respective Rate Schedule will be increased by $290.00 per month per meter for a total of [insert # of Retail Customer B installations] separately metered Retail Customer B Installations.

4. In lieu of separate electrical facilities to receive distribution voltage service from Company, (1) Retail Customer B's electrical requirements will be supplied through Retail Customer A's Distribution Panel and (2) Company will meter said service with no regard for losses on retail Customer's side of the point of delivery. Retail Customer A and Retail Customer B will arrange their electrical wiring in a manner acceptable to Company.

5. For billing purposes, Company will subtract the sum of Retail Customer B's kW, kVA and/or kWh usage from the total metered usage for each separately metered Retail Customer B Installation (the combined metered usage of Retail Customer B and Retail Customer A) before calculating Retail Customer A's monthly bill with no regard for electrical losses or clock synchronization differences.

6. Both Retail Customer A and Retail Customer B agree that if metered kW, kVA and/or kWh data for either retail Customer is either not available or faulty during any part of a billing period, Company will estimate such kW, kVA and/or kWh data in order to determine both Retail Customer A's and Retail Customer B's bill.

7. Retail Customer A and Retail Customer B agree to indemnify and hold Company, its officers, agents, affiliates and employees harmless from any claims, causes of action, losses, damages, suits and liability of every kind (including all expenses of litigation, court costs and attorney's fees) for injury to or death of any person, or for damage to any property, or for economic loss, arising out of or in connection with the delivery service arrangements set forth herein, and resulting from any causes whatsoever, except only as a result of the sole negligence of Company. Retail Customer A agrees to allow Retail Customer B to receive electrical service through Retail Customer A's Distribution Panel as long as this Agreement is in effect and Retail Customer B is taking the distribution service described herein.

8. This Agreement shall become effective on _____, 20 _____.

9. This Agreement shall continue in effect until terminated, which termination may be provided for by Retail Customer A, Retail Customer B or Company giving written notice of such termination to the other two parties at least one (1) year in advance of the date of termination.

10. Except as expressly supplemented and amended by paragraphs 1 through 9 above, the provisions of the rate schedules specified in paragraph 2 and paragraph 3, and the Service Rules and Regulations in the Company's Tariff are not otherwise affected hereby.

11. This Agreement shall not be binding upon any party unless and until it has been duly executed in writing by all parties.

CenterPoint Energy Houston Electric, LLC

_____
Vice-President

Date _____

Submitted by _____

_____
Retail Customer A

By _____

_____
(Name printed or typed)

Title _____

Date _____

_____
Retail Customer B

By_____

_____
(Name printed or typed)

Title _____

Date _____