Connecting
Electric Vehicle Charging and Multi-Family Housing

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Research Topic

1. **Guidelines for installation of EV charging stations in multi-family housing**

2. **Develop a web-based interactive tool**

Research Sponsor

STV 100 Years

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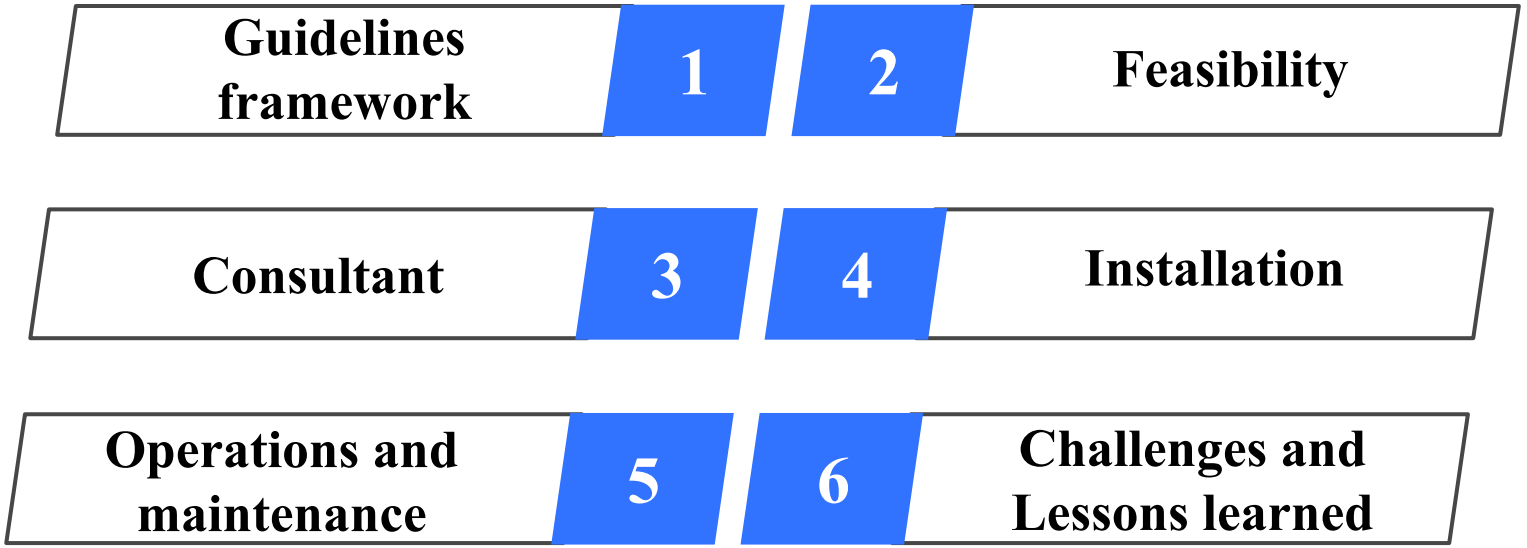
Semester Recap

1. **Introduction**
   - Types of charging stations
   - Best practices
   - Permits
2. **Requirements and case studies**
   - Case studies
   - Owner prerequisites
   - Key considerations
   - Charging installation process
3. **Programs and Incentives**
   - EV charger providers: programs
   - NYC case study
   - Maintenance

Poster presentation on October 18, 2022, during CBIPS board meeting

Agenda

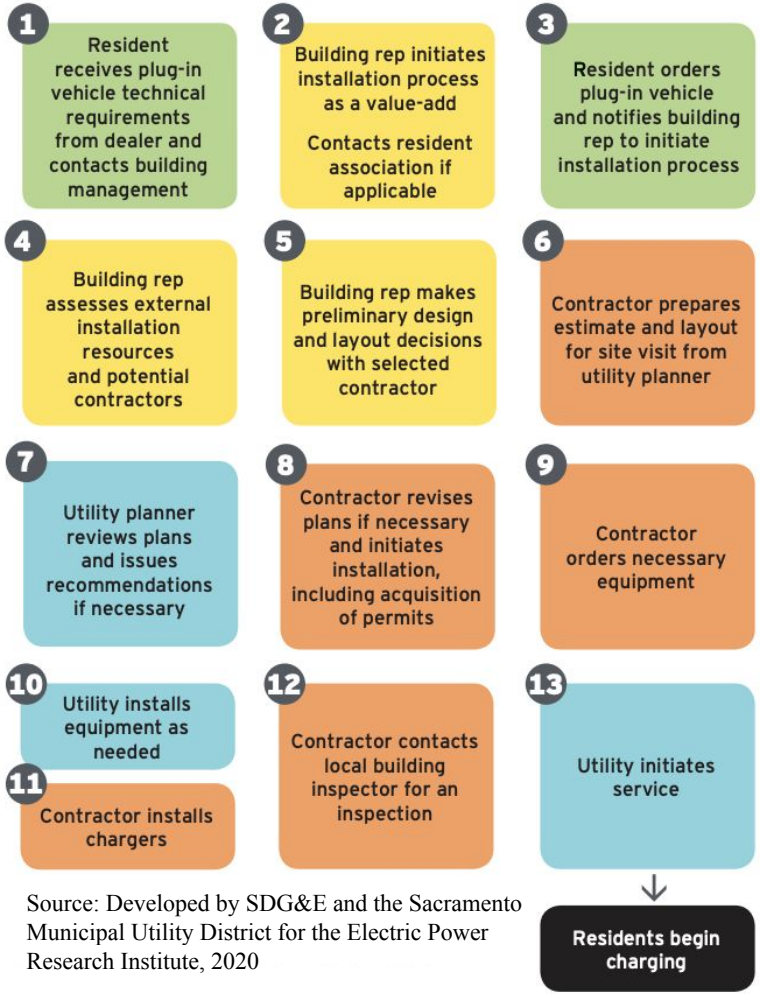

Guidelines framework
1
2
Feasibility
Consultant
3
4
Installation
Operations and maintenance
5
6
Challenges and Lessons learned

Guidelines framework: owner's perspective

How to set up plug-in charging at your condo, townhome or apartment*

Typical responsibilities / roles

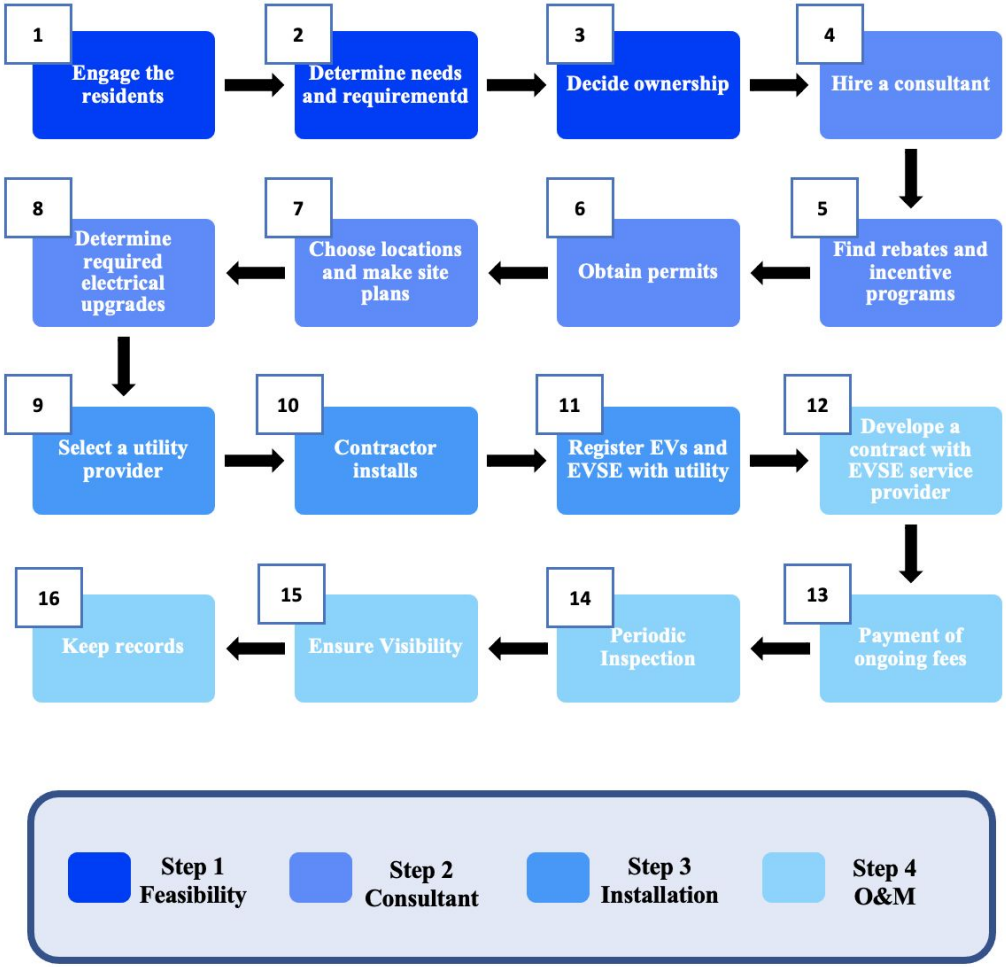
Tenant | Building representative | Contractor | Utility



Source: Developed by SDG&E and the Sacramento Municipal Utility District for the Electric Power Research Institute, 2020

Owner's Perspective

Step 1: Feasibility	Step 2: Consultant	Step 3: Installation	Step 4: Operations & Maintenance
1. Engage the residents about the initiative 2. Determine the needs and requirements 3. Decide ownership	1. Meet with a consultant 2. Discuss about rebates and incentive programs 3. Check municipal permit requirements and then obtain permits 4. Choose location and make site plans 5. Determine if electrical upgrades are necessary	1. Select a utility provider 2. Contractor installs outlets and charging stations 3. Register the EVs and the EVSE with the utility company	1. Develop a contract with an EVSE service provider 2. Payment of ongoing fees 3. Periodic inspection of EV charging stations 4. Ensure visibility 5. Keeping records


1
Engage the residents
2
Determine needs and requirementd
3
Decide ownership
4
Hire a consultant
5
Find rebates and incentive programs
6
Obtain permits
7
Choose locations and make site plans
8
Determine required electrical upgrades
9
Select a utility provider
10
Contractor installs
11
Register EVs and EVSE with utility
12
Develope a contract with EVSE service provider
13
Payment of ongoing fees
14
Periodic Inspection
15
Ensure Visibility
16
Keep records
Step 1 Feasibility
Step 2 Consultant
Step 3 Installation
Step 4 O&M

Step 1: Feasibility

1. Engage the residents about the initiative → Conducting a resident survey to gauge interest in EV charging to determine if the residents have/are thinking about owning an EV, overall attitude towards EV, and their preferences for charging infrastructure

2. Determine the charging needs and requirements → Choose between level 2 and level 3 chargers.

3. Determine ownership → Site host owned vs third party owned

Source: Pollution Probe and Delphi Group, Guide to EV Charging in MUD Housing, 2020

Determine Ownership

Site host-owned

1. Charging infrastructure owned by the site host is purchased, installed, and maintained by the site host
2. Allows full control over the station and the ability to keep all revenue from the station (if applicable)
3. Site hosts are responsible for all associated costs, including any maintenance or payment transaction fees

Third party-owned

1. Charging infrastructure owned by a third party is installed and maintained by the third party
2. Minimizes responsibility to the site host
3. The site host may also earn revenue by leasing the space occupied by the charging infrastructure to the third party.

Source: Alternative Fuels Data Center, U.S. Department of Energy, 2022

Step 2: Consultant

1. Meet with a consultant → Consult about existing electrical capacity, metering options.

2. Discuss about rebates and incentive programs → Consult state's EV Infrastructure rebate program for eligibility criteria. Consult the utility providers for incentive eligibility criteria.

3. Check municipal permit requirements and then obtain the required permits → Obtain an electrical permit from the city. The electrical contractor can do this on the owner's behalf.

Supporting Documentation	Description
Plot Plan	Identify the complete layout of existing parking spaces and proposed location of EVSE parking space(s) with respect to existing building and structures
Electrical Load Calculations	Home electrical load calculation that estimates if an existing electrical service will handle the extra load from residential EVSE and wiring methods based on the California Electrical Code (see sample electrical plan)
Electrical Plans	Single-line diagrams showing the system, point of connection to the power supply and the EVSE
EVSE Information	The EVSE manufacturer's installation instructions and charger specifications

Source: Chicago gov, How to install EV charger in Apartments and Condo, 2022
Image source: *Rescomm EVSE Permit guidelines v3 - energycenter.org* , 2011

4. Choose location and make site plans

Identify parking layouts and electrical configurations that lend themselves to lower cost charging infrastructure installation e.g. parking spots close to existing electrical outlets.

5. Determine if electrical upgrades are necessary

Determine whether any electrical upgrades are required to accommodate EV charging.
Two different sorts of electrical modifications could be necessary:

1. Adding capacity to the unit or house panel and/or
2. Upgrading electric service capacity to the MUD from the utility

Source: City of Somerville, MA, Guide to EV Charging Equipment, 2021

Step 3: Installation

1. Select the utility provider
   - Hire an electrical contractor approved by the utility provider

→ Consult the utility provider about their EV charging programs. Sign the contract for them to come install the infrastructure.

2. Contractor installs outlets and charging stations

→ Have the contractor complete the installation. The contractor can also arrange for the city to inspect the new outlet after installation.

3. Register the EVs and the EVSE with the utility company

→ Utility company needs to accurately track the number of PEV charging stations installed to properly plan for local increases in electricity demand due to vehicle charging. The combined effect of several chargers in the same area could result in overloads on utility secondary wires and transformers. This is an important component for providing safe and reliable electricity to all.

Source: Chicago gov, How to install EV charger in Apartments and Condo, 2022

Step 4: Operations and Maintenance

1. Develop a contract with an EVSE service provider

→ EVSE service provider handles all aspects related to EV charging station operation, maintenance, and customer billing (depends on the ownership).

2. Pay the ongoing fees

→ Payment of ongoing fees (e.g., session fees + incremental fees on electricity costs) will still need to be managed. An experienced electrical contractor or EVSE provider can help determine the most appropriate options.

3. Periodic inspection of the EV charging stations

→ Testing of equipment, communication systems and lighting by an electrical contractor to ensure all parts of the EVSE are in working order. The EVSE provider's guidelines should also be consulted as they will include a description of the maintenance requirements specific to their stations.

Source: Pollution Probe and Delphi Group, Guide to EV Charging in MUD Housing, 2020

4. Ensure Visibility → Confirm the mode of tracking and maintenance of fail/pass inspections conducted on charging stations and charging bills and records with the EVSE service provider

5. Keep Records → Extracting and compiling records of the equipment maintenance, charging records and other key information related to the EV charging stations

Source: The five pillars of EV charging station maintenance and management, 2020

Challenges
&
Lessons Learned

Challenges

- Getting in touch with the building managers
- Leasing office - lack of technical knowledge
- Finding NY case studies
- Incentives - financial information provided but not the technical requirements from the owner's side

Lessons Learned

- Having partnerships with housing authorities and property managers
- Strengthen the ways to incentivize the building owners for interviews
- Massive gap between the incentives and knowledge passed

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Appendix

Introduction

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Timeline

Step 1(10/04)

Introduction to project, research, and analysis

Step 2 (10/25)

Phase 1 finding and framework development

Step 3 (11/22)

Phase 2 + 3 findings and framework development

October 2022

SUN	MON	TUES	WED	THURS	FRI	SAT
						1
2	3 Group Meeting (3:30pm-4:30pm)	4 CBIPS MEETING PRESENTATION	5	6	7	8
9	10 Columbus Day; Framework of Survey and Recipients List; Group Meeting (3:30pm-4:30pm)	11 Review Survey Questions and Prepare for tmr Meeting	12 Meeting with Lauren	13	14 Distribute the Survey	15
16	17 Boss's Day	18	19	20	21	22
23 Case Study and Research Part Completion **DEADLINE**	24	25 CBIPS MEETING PRESENTATION	26 Meeting with Lauren	27	28 Data Collection Completion (pending)	29
30 Funding Opportunities	31 Halloween	**October Goal** 1. Finish the research and case study; 2. Send out the survey/interview invitation				

MEETING;
GROUP WEEKLY MEETING;
TASK

Phase 1

Determining EV prerequisites and feasibility

Types of charging stations

Type	Miles per hour of charging	Infrastructure needs	Locations	Utilization rate
Level 1	2 to 5	▪ Single-phase AC ▪ 120V /16A ▪ Capacity of up to 1.9 kW ▪ No addnl. equipment needs	Homes and sometimes workplaces	30% - 50%
Level 2	10 to 20	▪ Single-phase AC ▪ 240V / 32-80 A ▪ Capacity of 7.6-19.2 kW ▪ Needs addnl. equipment	Homes, workplaces, and public chargers	5% - 10%
Level 3 (DC fast chargers)	180 to 240	▪ 480V AC input ▪ Capacity higher than 22 kW ▪ Needs high-power, special equipment	Public charging stations esp. along heavy traffic corridors	5% - 8%

Image Source: United States EV charging infrastructure: Rising role of utilities?, ADI Analytics, 2020

Survey

Social Housing Survey

- **Conditional Survey**
  1. EV installed? Yes/no
  2. Different questions per answer
- Focus Market : NYC

Vendor Requirements

- **Requirements**
- **Questions: TBD**

Installing charging stations

- Identify the need: EVI-Pro Lite tool
- Ensuring equitable access
- Cost considerations: Equipment + Installation

Source: Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite, US Department of Energy, 2022

Installation of Chargers in Municipal Garages

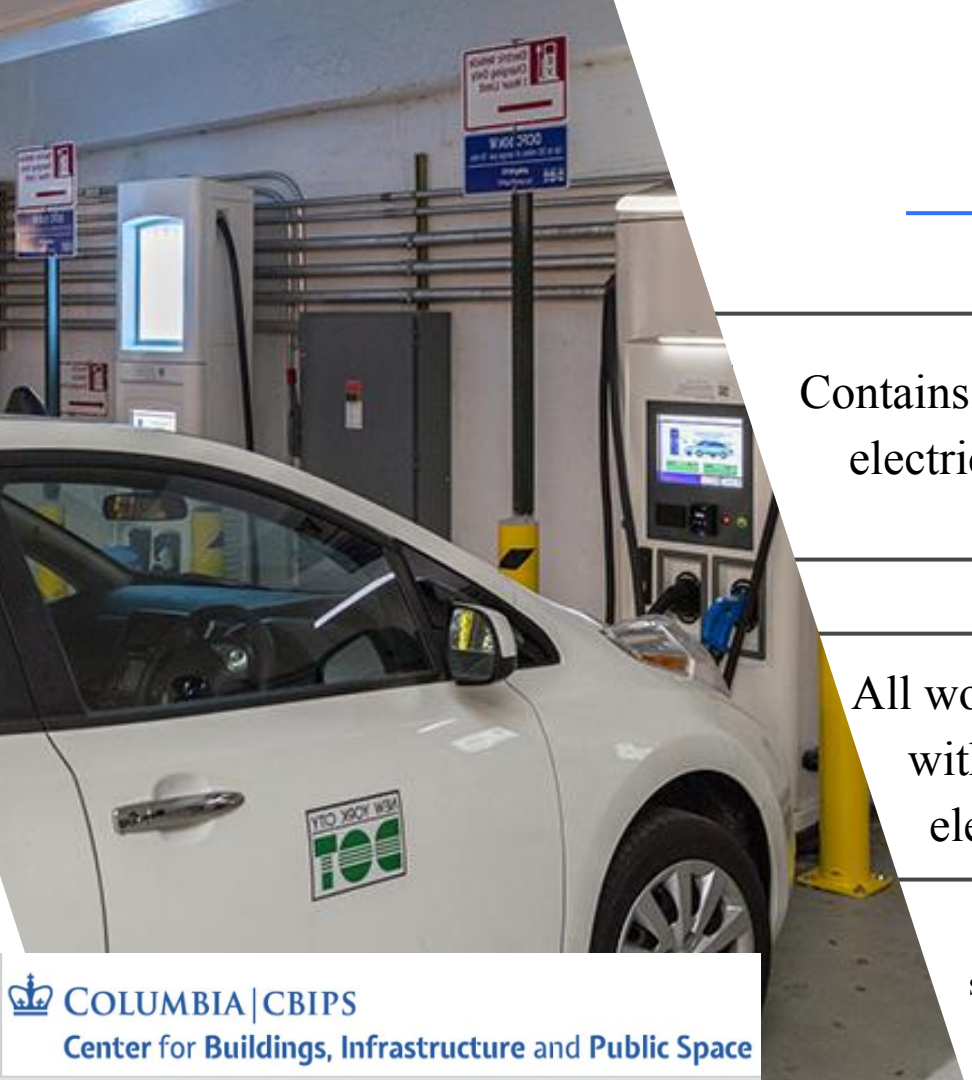
DC Fast Charger Program

- September 2017; $10 million investment
- New York has started installing L2 DC fast chargers at municipal parking garages.

Advantages

- Cover facilities protecting equipment
- Reduce snow removal needs
- Reduce installation cost
- Fees for EV charging can be included in parking costs

Source: DC Fast Charger Program, NYC Department of Transportation, 2022



Permit

Contains a general reference to the NEC or electrical code used in the jurisdiction

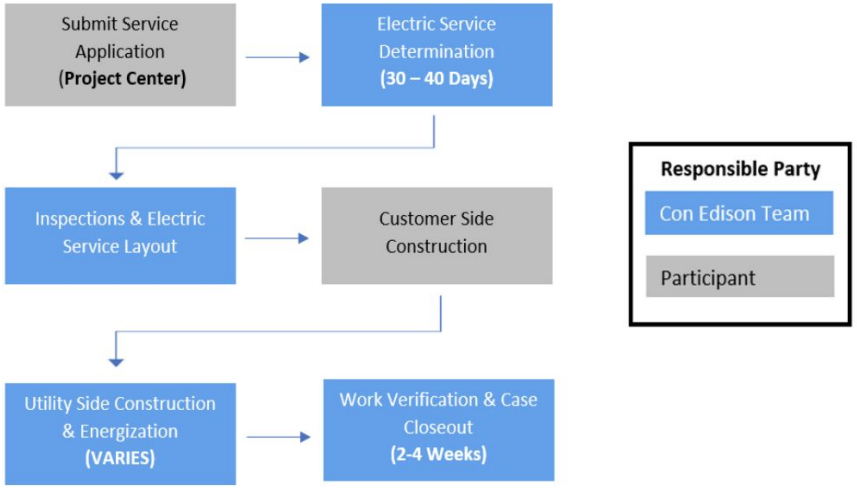
All work and installed equipment will comply with the requirements of the NEC or the electrical code used in the jurisdiction

Source: Permit for Charging Equipment Installation, US Department of Energy, 2012

Vendor Requirements: Con Edison

Steps for Requesting Electrical Service for their Electric Vehicle Charging Station Installation

Customer requests for a new or additional electric service for their new EV charging station installation, should be submitted through our website, https://www.coned.com/en/small-medium-size-businesses/building-project-center Project Center.



Source: Electric Vehicle Charging Station Installation Guide, Con Edison, 2022

NYPA EV charger plan

New York Power Authority

2013

The Charge NY Program

2018

The Charge NY 2.0

2018

Evolve NY

2022

BEHIND SCHEDULE

Source: EVolve NY's Mission: a Fast Electric-Charging Station Near You, NY State of Opportunity, 2022

Case Studies

Public Program Initiatives

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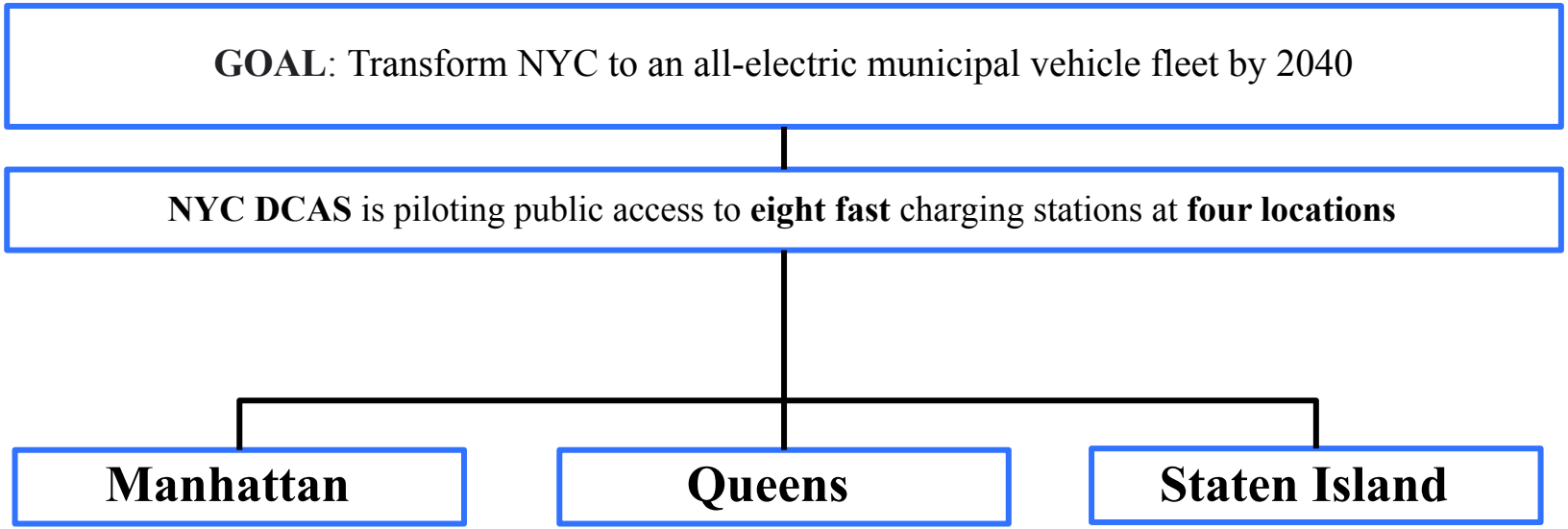
Department of Citywide Administrative Services (DCAS)



Source: City has accelerated the expansion of electric vehicle fleet, NYC DCAS, 2022

Milestones

1. The city's fleet of electric vehicles has reached 4,050 this month.

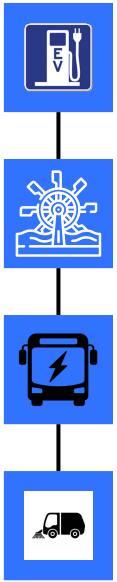
2. Operates the largest electric vehicle charging network in New York State

3. Bought roughly 2,300 EVs for public use. 1,000 dedicated L2 charge connections

4. Ordered seven electric garbage trucks for the New York City Department of Sanitation (DSNY)

Source: City has accelerated the expansion of electric vehicle fleet, NYC DCAS, 2022

Future plans



DCAS will deploy another 600 charging ports in the next 18 months

DCAS expects to own and operate over 4,500 EVs as soon as June 2023

The agency also plans to order all-electric buses for the New York City Department of Corrections

The agency plans to order seven all-electric sweepers and 30 plug-in hybrid electric sweepers for DSNY

Source: City has accelerated the expansion of electric vehicle fleet, NYC DCAS, 2022

Best practices for operating and maintaining charging stations

Image Source: Shutterstock

Policies

Establish policies that specify enforcement and consequences to restrict others from parking in these spaces

Image Source: NY State of Opportunity - NY Charge

Signage

Helps navigate to EV charging station spaces and helps to prevent EV charging spaces from being occupied by non-EVs

Image Source: Wattlogic

Usage Fees & Advertising Revenue

Establishing fee structure: per hour, per session, or per unit of electricity.

EV chargers

53,936

Source: US department of Energy- Alternative Fuels Data Center, 2022

Available funding

Inflation Reduction Act (IRA)

- An alternative fuel vehicle refueling property credit for 30% of total costs of purchase and installation of charging equipment—up to $100,000 per charger
- The act will additionally provide $3 billion to help support access to EV charging for economically disadvantaged communities through the neighborhood access and equity grant program.

Source:EV infrastructure funding and financing, US department of Transportation, 2022

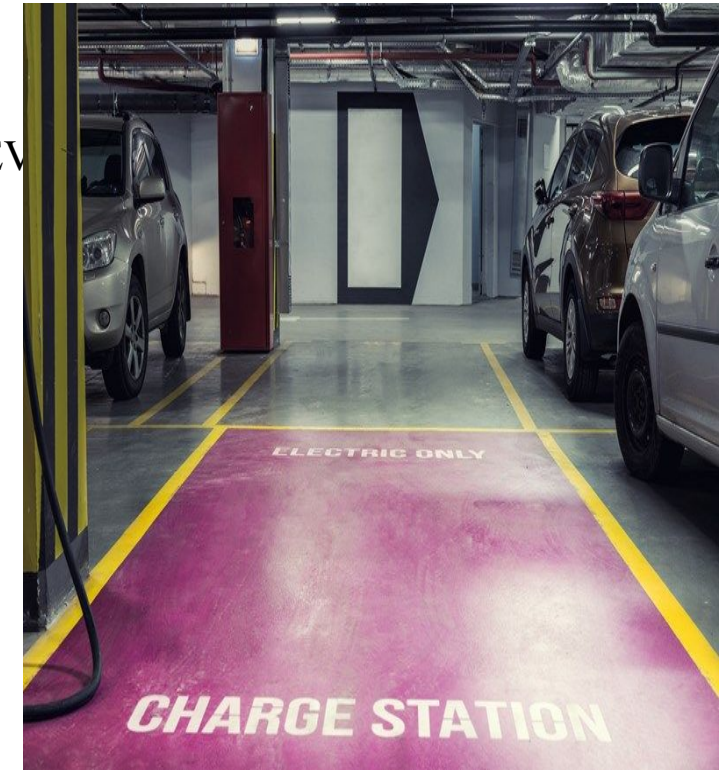
Available funding

Bipartisan Infrastructure Law

- Provides $5B in NEVI formula funding to help states install EV chargers along interstate highways.

Discretionary Grant Program for Charging and Fueling Infrastructure

- Provides $2.5B for increasing EV charging in rural, underserved and overburdened communities.



Source:EV infrastructure funding and financing, US department of Transportation, 2022

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Requirements and Case Studies

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Agenda

1. Recap
2. Case studies
3. MFH Owner prerequisites
4. Installation process

Recap

1. Types of charging stations
2. Survey development
3. Permits
4. NYPA charging plan
5. Department of Citywide Administrative Services (DCAS)
6. Best practices
7. Available funding opportunities

Case Study 1: Smart Columbus

Smart Columbus, 2018

- EV adoption through a rebate for charging stations at multi-unit dwellings
- 4 Objectives:
  1. Leverage Paul G. Allen Philanthropies (PGAPh) smart city grant funds
  2. Improve the charging installation/ EV ownership process
  3. Encourage widespread deployment
  4. Learn about charging behavior

Source: Smart Columbus , Atlas Public Policy, 2018

Smart Columbus case study

- The first round of the rebate program resulted in 11 approved sites supporting 48 Level 2 charging ports.
- Total cost of $167,998
- Clean Fuels Ohio3 (CFO), will conduct the inspections of the charging equipment and provide rebate funds
- The contract and rebate requirements hold the recipients accountable for installing the charging equipment
- Outreach was critical to ensuring broad interest in the program
- Smart Columbus is providing financial and educational resources to increase the number of charging stations in four sectors: residential, workplace, public and fleet.

Image Source: Columbus gov, 2022

Source: Smart Columbus , Atlas Public Policy, 2018

Challenges

Types of MUDs

- Owned or rented
- Apartments, condos, townhouses
- Shared vs assigned
- Not a single charging option available

Installation Process

- Infrastructure developer must work with tenants, utilities, permitting officials, etc
- Establish policy for charging use

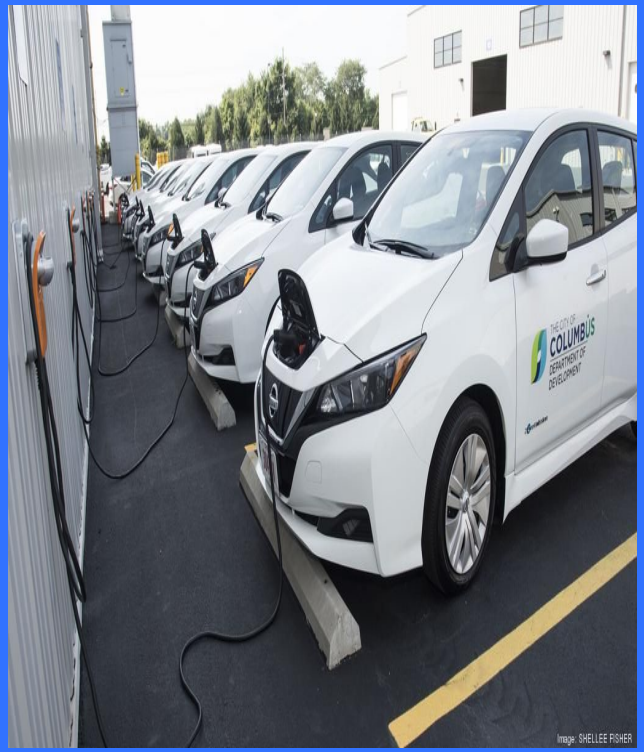
Cost

- Equipment, labor, permitting, upgrades to the electrical system
- Level 2 charging - between $2000 to $10,000

Source: Smart Columbus - Atlas Public Policy 2018

Image Source: Columbus gov, 2022

Execution of rebate program



- Initial Funding: $172,000 to deploy 30 level 1 charging
- The goal was to have the MUDs ready to install more charging equipment if the demand from residents increased
- Applicants could only receive up to $25,000 per site to ensure more properties received a rebate. Spread the funding across the region.
- Goal of the MUD rebate program was to learn more about charging behavior at MUDs

Source: Smart Columbus - Atlas Public Policy 2018

1st GOAL: LEVERAGE PGAPh GRANT FUNDS

- $3,500 per plug/space
- 35% cash match requirement
- Two spaces for ≤ 20 units; Three spaces for 21-40 units; Four spaces for > 40 units
- Six months to complete project and collect the rebate

2nd GOAL: IMPROVE INSTALLATION / OWNERSHIP PROCESS

- Detailed site and engineering plans required
- Consult with utility to confirm site is suitable.
- Level 1/2 equipment, installation, signage, stenciling, other equipment, education/promotion
- Eligible users should be made clear through signage
- 30 days free and "reasonable" monthly fee afterwards
- Facilities will maintain ownership

3rd GOAL: ENCOURAGE WIDESPREAD DEPLOYMENT

- Franklin, Delaware, Union, Madison, Pickaway, Fairfield, and Licking Counties
- $25,000 max per property

4th GOAL: LEARN CHARGING BEHAVIOR

- Equipment must be capable of recording user data
- Allow utility control for demand response.
- Quarterly reports and data sharing for three years

Goals of the rebate program

Image Source: Atlas Public Policy, 2018

Case Study 2: The Towers at Costa Verde

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The Towers at Costa Verde San Diego

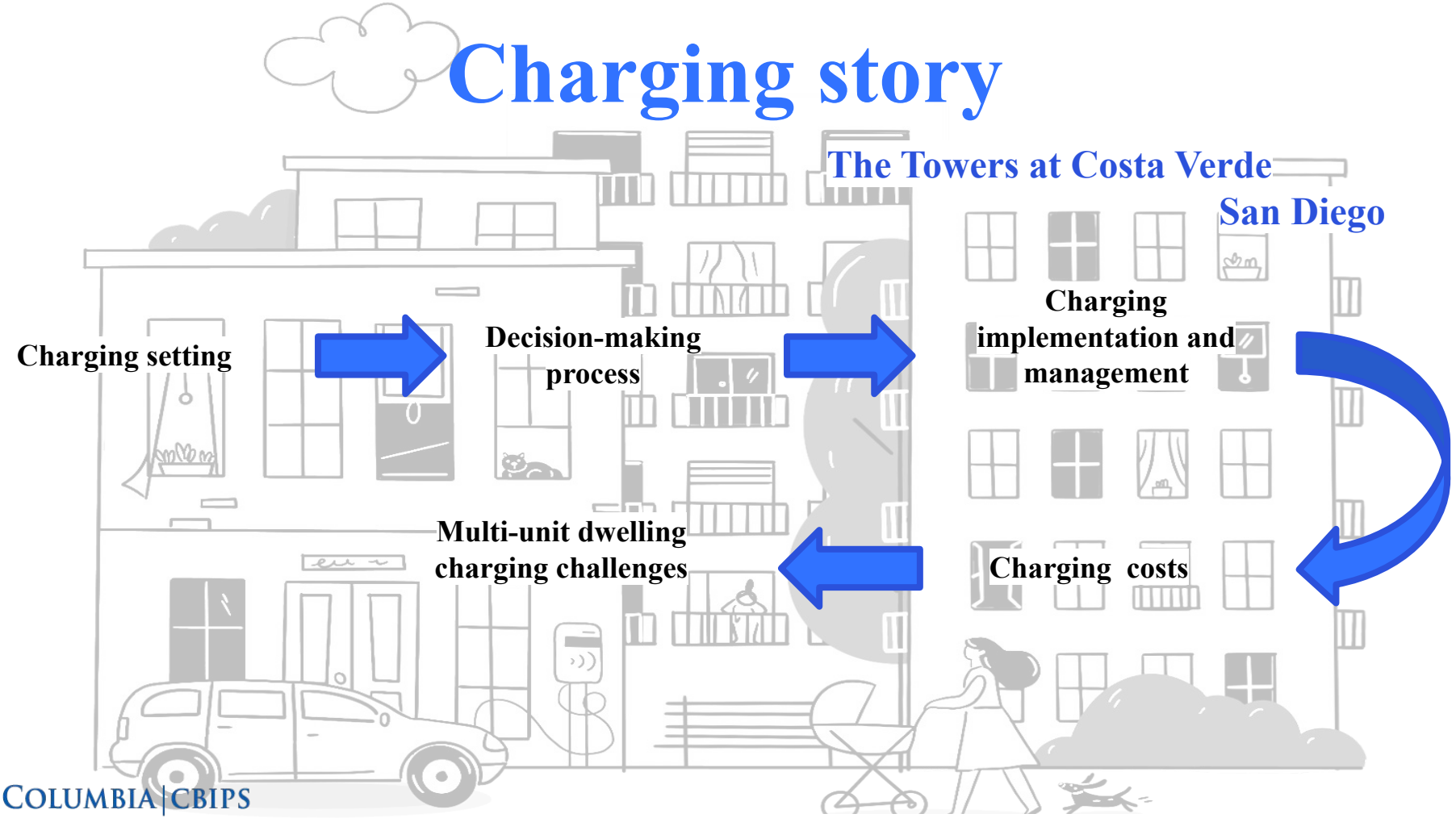
Charging snapshot

- Number of units: 590
- Number of parking space: 1080
- Number of residents currently driving EVs: varies with rental client
- Number of charging stations and types: **Level 2**
  - 10 installed and 10 pre-wired for additional stations
- Billing managed by NRG eVgo
- Install costs approx. $21,000 under NRG eVgo settlement

Image Source: Garden Communities, 2022

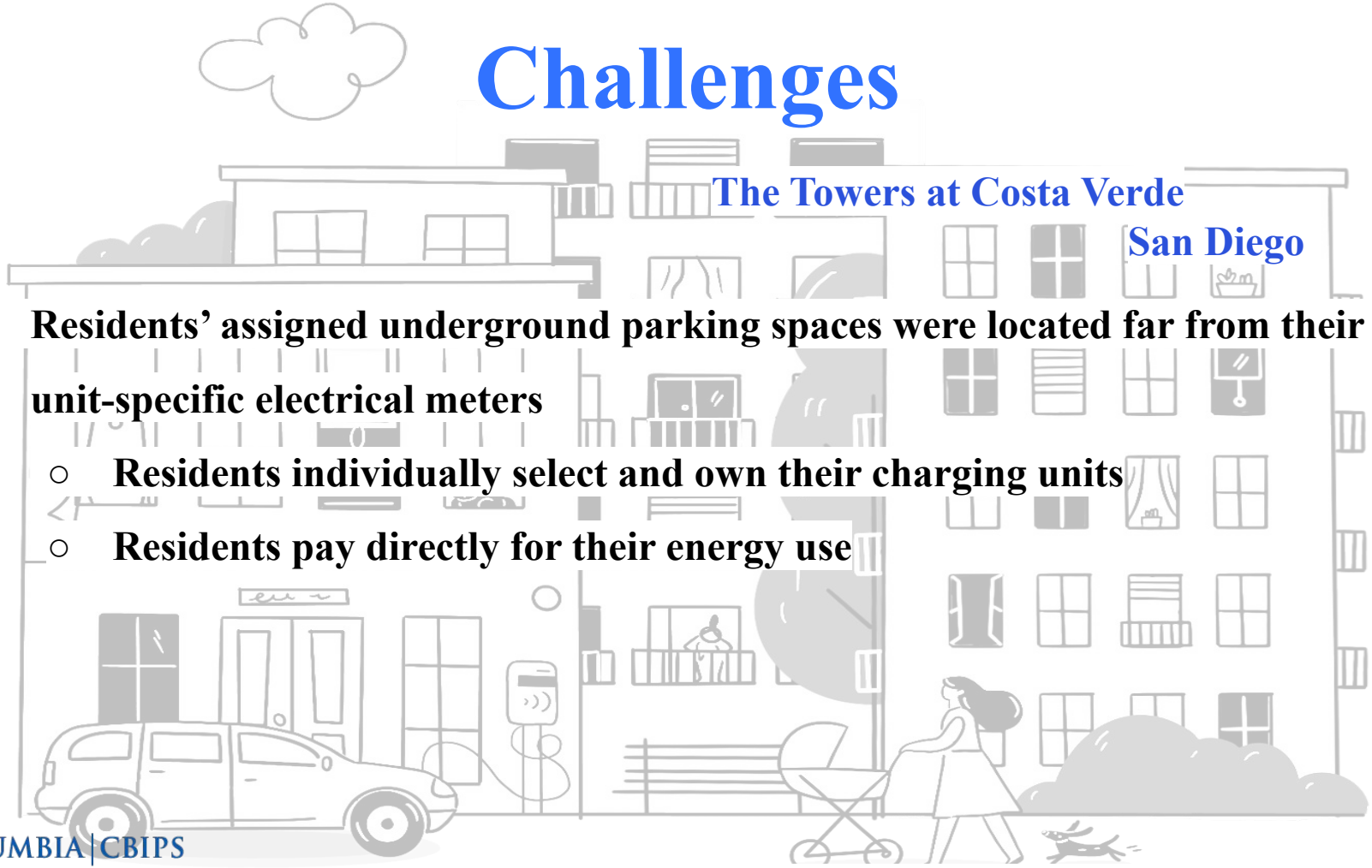
Source: Krantz, H. (2017). Case studies California plug-in Electric Vehicle Collaborative

Charging story



Source: Krantz, H. (2017). Case studies California plug-in Electric Vehicle Collaborative

Challenges



The Towers at Costa Verde

San Diego

- **Residents' assigned underground parking spaces were located far from their unit-specific electrical meters**
  - **Residents individually select and own their charging units**
  - **Residents pay directly for their energy use**

Source: Krantz, H. (2017). Case studies California plug-in Electric Vehicle Collaborative

Case Study 3:
Muir Commons

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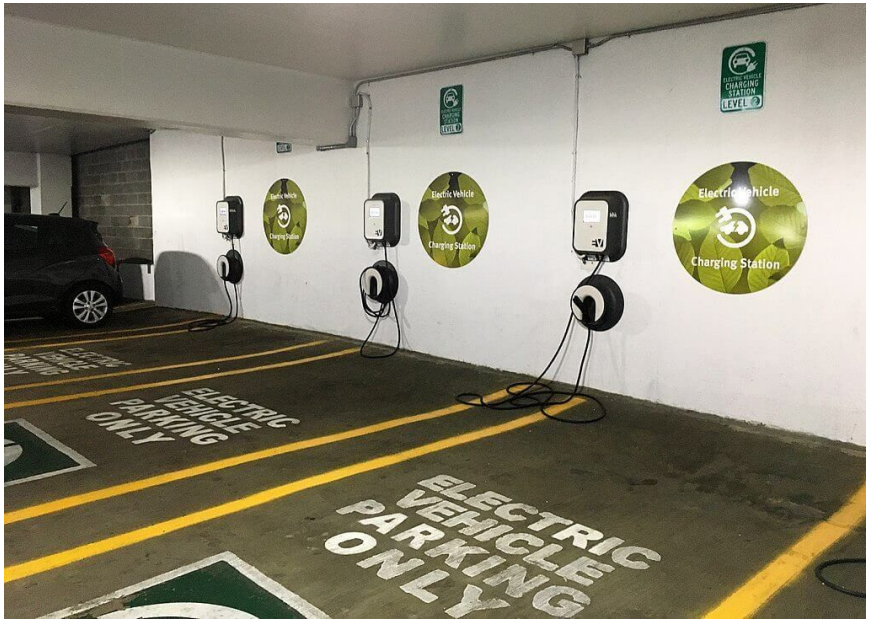
Muir Commons a case study in MUD EV infrastructure

- A townhouse community in Davis, California
- Muir Commons opened in 1991, is a “cohousing complex”
- It is at the forefront of adopting renewable energy technologies.
- In 2002, the community self-funded and installed rooftop solar installation

Source: Morris, Muir Commons: A case study in mud EV infrastructure , 2019

Pacific Gas and Electric (PG&E) goals



- Installing 7,500 Level 2 chargers at multi-unit dwellings and workplaces between 2018 and 2020
- Offers grants and installation assistance to property owners

Source: Morris, Muir Commons: A case study in mud EV infrastructure 2019

Pacific Gas and Electric (PG&E) cost

- PG&E originally wanted each resident to pay $1,150, which it calculated was equivalent to the cost a single-family homeowner would pay to install a charger.
- This was a non-starter with the residents who didn't own EVs.
- In the end, the utility agreed to charge each household $550, to be paid off in installments of $25 per month, interest-free.
- Residents who later buy an EV will qualify for an additional $800 grant.

Source: Morris, Muir Commons: A case study in mud EV infrastructure 2019

Challenges	Outcomes
Transformer was operating at 100% capacity	26 charging stations have been up and running since last August
Extensive trenching was required	
Getting the project approved by all the neighbors was a challenge.	The Muir Commons residents opted for an arrangement under which PG&E will own the hardware for 10 years, after which ownership will pass to the residents.
Without the PG&E grant, installation costs would have exceeded $20,000 per charger.	

Source: Morris, Muir Commons: A case study in mud EV infrastructure 2019

Case Study 4:
CityFront Terrace

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CityFront Terrace, 2012

- Located in Marina district of downtown San Diego
- Built in 1993 with 13 stories and over 300 condominium residences
- Assigned underground parking spaces
- Need for EV charging infrastructure due to residents buying Electric Vehicle in 2011
- Residents to pay for their energy usage directly without the property managers having to track usage or collect payments.

Source: Multi-Unit Dwelling Case Study - CityFront Terrace (F) (2).Pdf, 2012

Some technical situations

Individual meters for each charging unit:

- Using San Diego Gas & Electric's billing direct to each resident installing and using a vehicle charger.
- Removes the property manager as the middleman
- After some negotiation CityFront agreed to install 20 individual meters wired directly to the utility side of the building electrical supply

Source: Multi-Unit Dwelling Case Study - CityFront Terrace (F) (2).Pdf, 2012

Some technical situations

Individual user billing

- Each resident receives their monthly bill directly from San Diego Gas & Electric and sees first hand their individual time-of-use behavior and resulting cost savings from the utility's special low electric vehicle rates.
- Removing additional work for the property managers by having billings going directly from the utility to the residents.

Source: Multi-Unit Dwelling Case Study - CityFront Terrace (F) (2).Pdf, 2012

Other upfront costs

- Each resident secures the required liability insurance
- Each individual requesting vehicle charging would pay an equal portion of the upfront capital expenditure for the project and purchase/own their own charging unit for installation in their space
- Initial capital required: **$80,000**
- Per resident: **$4000**

Benefits

- Removing additional work for the property managers
- The ability for residents to have a choice over charging station vendors
- The project allows for either removal or upgradation of the charging unit
- Being able to market the property as a facility that caters to forward-thinking electric vehicle drivers that supports a cleaner transportation options.

Source: Multi-Unit Dwelling Case Study - CityFront Terrace (F) (2).Pdf, 2012

Products and services

Billing	**Cost recovery billing through the HOA**
Metering	**San Diego Gas & Electric**
Engineering	**MPE consulting, Pacific Electric Inc.**
Installing contractor	**California Southwest Electric**
Electric vehicle rates	**10 Cents/kWh - 67 Cents/kWh**

Source: Multi-Unit Dwelling Case Study - CityFront Terrace (F) (2).Pdf, 2012

Case Study 5:
Green Rock Apartments

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Multi-unit dwelling procurement case study

- Green Rock apartments in Minneapolis, Minnesota, markets itself as "eco-conscious urban living"
- First Initiative: Downtown – Lofts location. Installed via Nissan incentive program and the program provided a free DC fast charger.
- Second Initiative: Green Rock Apartments installed Level 2 charging at three additional MUD buildings and at their corporate offices. Cost $600 per unit and $400 per unit for installation.

Image Source: Green Rock Apartment

Source: Multi-Unit Dwelling Procurement Case Study: Green Rock Apartments, 2019

Advantages and incentives

- All tenants are eligible for a $2,000 credit towards the purchase of a PEV.
- PEV owners also get free parking.
- The maintenance and cost of charging at the Level 2 chargers is included in their rent.

"The chargers are a major draw for tenants and make the units more valuable."

Dale Howey, Green Rock Apartments Owner

Source: Multi-Unit Dwelling Procurement Case Study: Green Rock Apartments, 2019

Some technical situations

Networked vs non-networked EV charging stations

- Purchase and installation costs
- Ability to set pricing of EV charging
- Promotion of the charging station
- Maintenance of the Station

Source: Networked vs. Non-Networked Chargers for Hosts, 2022

Phase 1 Summarization

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Owner prerequisites

Step 1

- Conduct a survey of residents

Step 2

- Contact a local service provider or a electrical contractor

Step 3

- Contact local utility

Step 4

- Consider different approaches to installing EVSE

Step 5

- Contact municipal government for permitting and inspection

Source: *Plug-in electric vehicle charging - veloz,* 2013

Key consideration

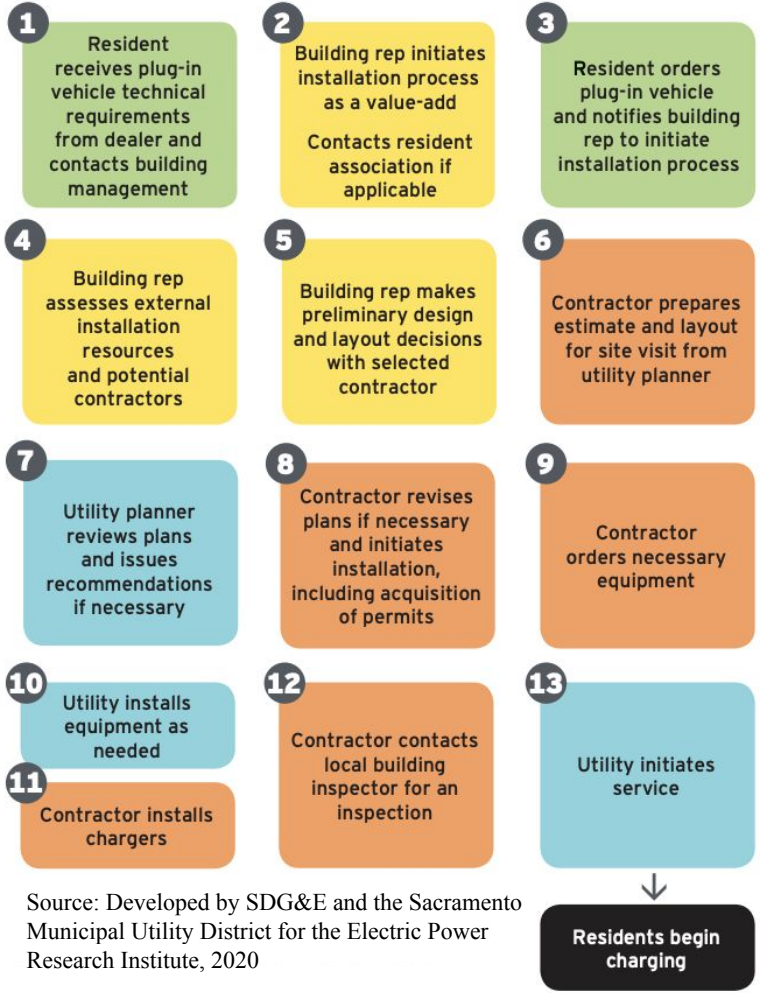
- Building architecture and physical electrical design
  - Proximity of electrical service room to desired charging location
  - Wiring needed to accommodate charging stations
- Commercial electricity rates for common-area meters
- Cost of installation
- Parking ownership models

Source: *Plug-in electric vehicle charging - veloz,* 2013

How to set up plug-in charging at your condo, townhome or apartment*

Typical responsibilities / roles

Tenant | Building representative | Contractor | Utility



Source: Developed by SDG&E and the Sacramento Municipal Utility District for the Electric Power Research Institute, 2020

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Programs and Incentives

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Recap

1. **Case Studies**
   - Smart Columbus
   - The Towers at Costa Verde
   - Muir Commons
   - CityFront Terrace
   - Green Rock Apartments

2. **Phase 1 Summarization**
   - Owner prerequisites
   - Key considerations
   - Charging installation process

Agenda

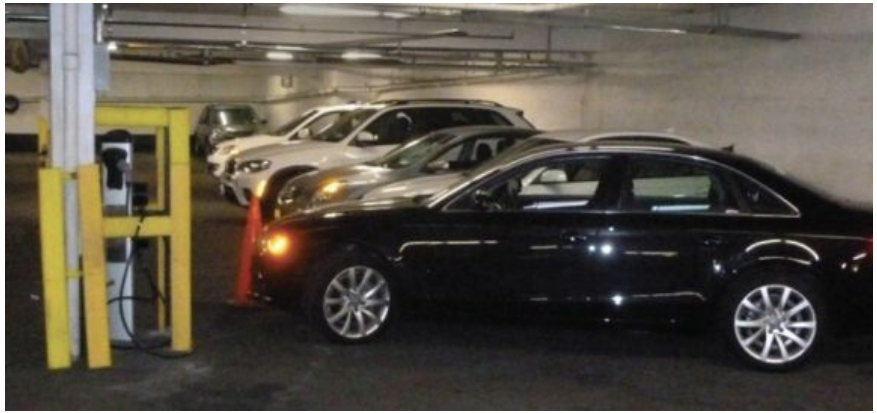
NYC case study	1	2	EV charger providers: programs and incentives
Maintenance	3	4	Guidelines framework

Charging stations at NYC multi-unit apartments

- This project was initiated to meet the needs of residents in multi-unit apartments as more electric vehicles (EVs) are purchased.
- The managers of these buildings, including buildings owned by the Albanese Organization, Glenwood Management, and Related Companies, worked to anticipate the needs of their varied clientele.

Source: Charging Stations at NYC Multi-Unit Apartments (Reliant Power. Tech), 2018

Charging stations at NYC multi-unit apartments



- The stations are maintained by third-party service providers such as CarCharging Inc., its subsidiary Beam Charging, or ChargePoint.

- Each of these service providers has various options for EV charging services. A common business model has the service provider owning and managing the station; paying the upfront installation costs, maintenance, and services; and sharing a portion of the revenue with the host location.

Source: Charging Stations at NYC Multi-Unit Apartments (Reliant Power. Tech), 2018

Lessons learned

Station installation at housing locations resulted in more tenants purchasing EVs as the charging infrastructure became available.

Operators are also seeing the benefit of installing 240V charging stations (instead of 110V outlets)

The higher power levels available allow users to receive more charge in less time and ensure that the EVs are fully charged when needed

Many of these buildings are also using the installation of the charging stations to help meet LEED Gold and Platinum certification.

Source: Charging Stations at NYC Multi-Unit Apartments (Reliant Power. Tech), 2018

Programs and Incentives

1) NY EV Make-Ready Program

Program highlights

- $701 million of available funding to support EV charging infrastructure
- 65,000 chargers to be deployed by 2025
- Approved applications will be eligible for **up to 50% - 90%** of EV charging equipment and installation costs
- Disadvantaged communities are eligible for up to **100%** of EV charging equipment and installation costs.
- **Eligible locations:** multifamily, public sector, workplace and destination properties
- Must install at least **2 ports** to qualify for the program

Joint utilities of New York:

1. Central Hudson Gas and Electric
2. Con Edison
3. New York State Electric & Gas Corporation
4. National Grid
5. Orange and Rockland Utilities
6. Rochester Gas and Electric

are offering **rebates** for Level 2 and DCFC charging station across the state of New York.

Source: NY EV Make Ready Program Participant Guide, 2020

Eligibility criteria

- Approved application: participant must apply to be accepted into the EV Make-Ready Program by the utility in whose electric service territory the proposed EV charging station will be located.
- Station maturity: construction of the EV charging station must have commenced no sooner than July 16, 2020.
- Location capacity: EV charging stations must conform to capacity guidelines including:

1. Minimum of two plugs
2. The number of plugs at locations in excess of ten plugs shall not exceed 50 percent of the target number of plugs established in the EV Make-Ready order for each utility

Orange & Rockland

Source: NY EV Make Ready Program Participant Guide, 2020

Operational requirements

- All charging stations must operate for a minimum of five years.
- Ownership of EV charging stations may change or stations may be upgraded during the five year term, as long as the number of plugs and the capacity of the station does not decrease.
- Participants agree to provide the utility with the necessary data regarding the installation and use of the EV charging equipment to facilitate necessary tracking of the program's overall operation and effectiveness on a quarterly basis.

Financial information

- Infrastructure and equipment costs
- Fee structure (structure of fee to the end-use customer, i.e., cost per minute, cost per kWh, cost per session and whether the station owner is providing charging for free)
- Charging revenues derived
- Operating costs, which should include energy-related costs and non-energy related costs separately identified.

Total Eligible Cost of the Project = Total make-ready costs + Total future-proofing costs

Source: NY EV Make Ready Program Participant Guide, 2020

Case study: 685 First Avenue

- First property in the region to install electric vehicle chargers under Con Edison's Power Ready incentive program.
- 10 level 2 charging plugs
- The program incentives cover two categories of equipment or infrastructure:

1. The first is the cost of utility electric infrastructure to connect and serve a new EV charger.
2. The second category is the customer-side equipment that is necessary to prepare a site for a charger that the charging station developer, owner, or site host operates.

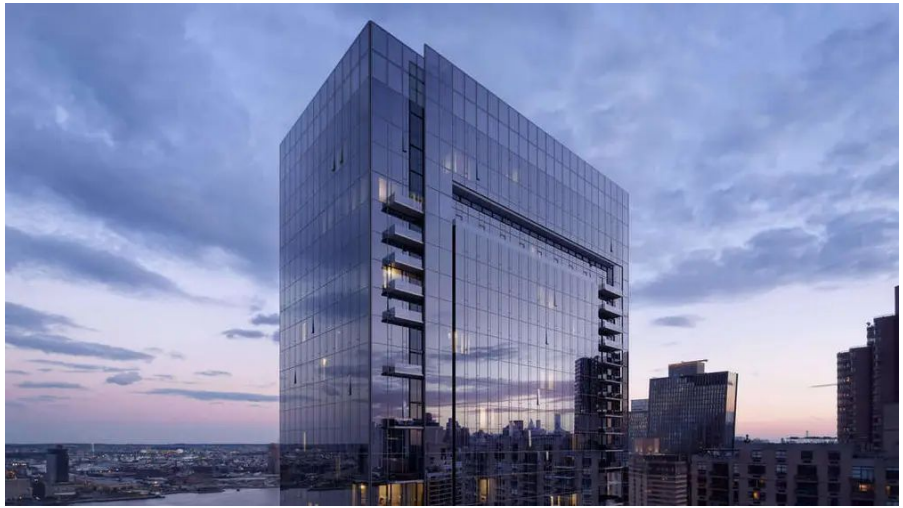


Image Source: City Realty, 2018

Source: Cision PR Newswire, 2021

2) EVolve NY: NYPA's EV fast charging network

- More charging stations, a more affordable option
- Make electric vehicles an affordable, viable option as part of a larger initiative to provide clean air for New Yorkers
- NYPA is dedicating $250 million through 2025 to the EVolve NY program
- At least 800 new EV fast charging stations installed through 2025.
- Works for any EV
- Charging station will be within 50 miles of their location

Sources: *Fast charging hubs New York, plug in electric vehicle, hybrid charging*. Fast Charging Hubs New York, Plug In Electric Vehicle, Hybrid Charging. (2019).

Operations

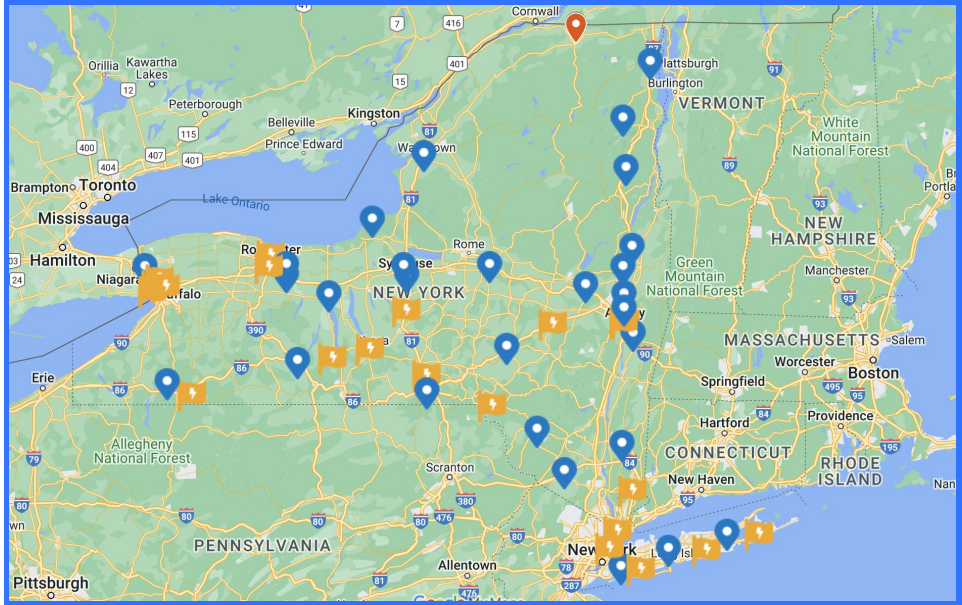
Payment option:

- Visa and Mastercard are accepted via chip insert
- American Express and Discover are accepted via swipe
- Mobile pay as well as online payment through various apps

Service

- 24/7 help in troubleshooting any charging or payment issues

EVolve NY upcoming site map



Source: *Fast charging hubs New York, plug in electric vehicle, hybrid charging*. Fast Charging Hubs New York, Plug In Electric Vehicle, Hybrid Charging. (2019).

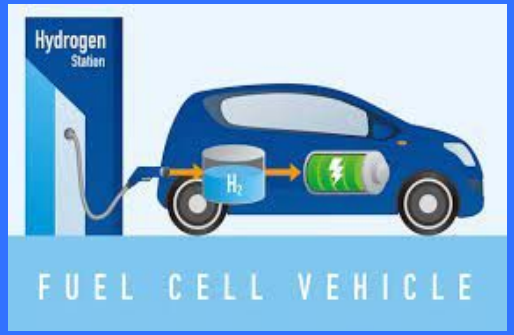
3) 2022 Municipal Zero-emission Vehicle (ZEV) Rebate Program

- The New York State (NYS) Department of Environmental Conservation (DEC) announced rebates to municipalities for the purchase or lease of battery electric, plug-in hybrid, and hydrogen fuel cell vehicles
- Rebates are available to municipalities that purchased or leased an eligible vehicle
- If the vehicle is leased, the minimum lease term is 36 months.
- DEC is committed to meeting the requirements of the climate act

Source: Guidelines and application instructions - new york state department of ... (September 30,2022).

Eligibility Criteria

- All municipalities (Manhattan, Bronx, Queens, Brooklyn, and Staten Island) in the State of New York
- Eligible vehicles
  - All-electric vehicles
  - Plug-in hybrid electric vehicles
  - Hydrogen fuel cell vehicles
- Vehicles that have been retrofitted are NOT eligible for a rebate under this program
- Vehicles that have been upfitted are eligible for a rebate.



Source: Guidelines and application instructions - new york state department of ... (September 30,2022).

Funding

- Rebates of up to $7,500 are available for ZEVs and up to $500,000 for ZEV fueling infrastructure.
- 40 percent ($300,000) will be prioritized for rebates to municipal applicants that intersect with at least one Disadvantaged Community
- The remainder ($450,000) is available for all municipalities and eligible projects

Minimum and maximum award amounts

- Minimum rebate amount per vehicle is $2,500
- Maximum rebate amount per vehicle is $7,500
- Rebate amounts cannot be a denomination other than $2,500, $5,000, or $7,500

Source: *Guidelines and application instructions - new york state department of ...* (September 30,2022).

4) DCFC Per-Plug Incentive Program (DCFC PPI)

- New, publicly accessible DC fast chargers (DCFC) 50 kW or greater are eligible for an annual incentive.
- The incentive will be based on the size of both the non-proprietary plug and the proprietary plug.
- Stations eligible for an incentive under this program must be usable without requiring a paid membership in a charging station network.
- Networked stations that offer single per-use charging fees payable through a commonly accepted payment method such as cash, credit, or debit will satisfy.

Orange & Rockland

Source: DFCF Per plug incentive program- Joint utilities of New york, 2022

Money awarded to each utility

Summary Table

	Central Hudson	Con Edison	National Grid	NYSEG	O&R	RG&E
Incentive funds paid to date	$210,043	$12,000	$5,221	$34,458	$12,257	$0
Incentive funds remaining for 2022	$4,189,957	$6,400,000	$8,994,779	$5,085,542	$1,651,743	$5,032,000
Total # of plugs	100	400	300	160	40	74
# of plugs enrolled to date	21	3	20	31	9	7
# of plugs 50-74kW	20	0	0	1	1	3
# of plugs 74kW and higher	1	3	13	30	8	4
# of plugs remaining for 2022	79	397	287	129	31	67

Table Last Updated: September 23, 2022

Source: DFCF Per plug incentive program- Joint utilities of New york, 2022

National Grid

Eligibility Year	2019	2020	2021	2022	2023	2024	2025	Total
Fixed annual incentive (First year: 2019)	$7,500	$6,428.57	$5,357.14	$4,286	$3,214.29	$2,142.86	$1,071	$30,000
Fixed annual incentive (First year: 2020)		$7,500	$6,429	$5,357	$4,286	$3,214	$2,143	$28,929
Fixed annual incentive (First year: 2021)			$7,500	$6,429	$5,357	$4,286	$3,214	$26,786
Fixed annual incentive (First year: 2022)				$6,429	$5,357	$4,286	$3,214	$19,286
Fixed annual incentive (First year: 2023)					$5,357	$4,286	$3,214	$12,857
Fixed annual incentive (First year: 2024)						$4,286	$3,214	$7,500
Fixed annual incentive (First year: 2025)							$3,214	$3,214

Source: DFCF Per plug incentive program- Joint utilities of New york, 2022

5) NYC Drive Clean Rebate

- The Drive Clean Rebate, which is available to all New York residents, provides electric car purchasers with a $2,000 point-of-sale rebate for new electric car purchases or leases. When combined with a federal tax credit of up to $7,500, it's a good incentive.
- Kathy Hochul also announced a $2.7 million grant to local New York State governments for the purchase of electric cars and the installation of zero-emission charging/fueling facilities. It is supported by the Environmental Protection Fund and managed by the Department of Environmental Conservation.

Source: Drive Clean Rebate for Electric Cars(NYSERDA), 2019

NYC Drive Clean Rebate

- There are more than 60 car models to choose from that qualify for the Drive Clean Rebate, you're bound to find an electric car that best fits your style, budget and driving needs. Cars like Volkswagen ID.4, Tesla Model 3 Standard Range Plus, Nissan Leaf (62 kWh), Kia Niro Electric are also a part of this fleet.
- The rebate that the car buyer gets on the new electric car depends on how much battery-only range the car has.

Source: Drive Clean Rebate for Electric Cars(NYSERDA), 2019

Funding Opportunities Table

Program	EV Make Ready	EVolve NY	Zero-emission Vehicle (ZEV) Rebate	DCFC Program	Federal EV Charger Incentives
Federal/State	State	State	State	State	Federal
Type of incentive	Rebate	Rebate	Rebate	Annual incentive payment/ Rebate	Tax credit
Total value	$701M	$250M	$750,000	$31M	
% Cost covered	50-90%			Varied throughout the 7 years	30%-max $1000 (residents) $30,000 (Commercial)

Maintenance

Maintenance

Level 1

- Have the outlet changed (lasts several years)
- Replace the cordset (lasts several years)
- Check for adequate tension (check annually)

Level 2

- Requires slightly more maintenance than Level 1
- Individual components can be replaced
- Budgeting upto $400/yr/charger

Level 3

- Requires significantly more maintenance than other levels
- Require regularly scheduled preventive and corrective maintenance for the upkeep of the cooling system, filters and other advanced components

Source: What Maintenance do Electric Chargers Need?, Wiretech Company, 2021

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