Supporting Material:

Plug-In Electric Vehicle Policy Impact Rubric

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Overview

This document is the companion document to the *PEV Policy Impact Rubric* (known simply as the "Rubric"). This document expands on the Rubric (shown in Figure 1) by providing explanations, examples, and discussion of the literature*.* The Rubric is a tool for government bodies and other stakeholders to evaluate light-duty plug-in electric vehicle (PEV) policies on their effectiveness of promoting PEV adoption. After applying this Rubric, jurisdictions have an overall score between 0 and 100 that indicates the strength of their PEV policies and helps identify policy gaps.

The Rubric was designed around a single purpose: to convey the impact of PEV policy on PEV adoption. All elements of the Rubric reflect this purpose. Other considerations in policy design—such as cost-effectiveness, political feasibility, and co-benefits—are not included as elements of the Rubric unless they link back to PEV adoption. The Rubric consists of 13 Policy

Figure 1. PEV Policy Impact Rubric

Categories with corresponding weights (Table 1). The maximum scores reflect the relative impact of the Policy Category on PEV adoption (a larger maximum score indicates greater potential impact). Policy Categories and their maximum scores were selected after an exhaustive review of academic literature, program evaluation reports, and multiple rounds of discussions with the Technical Advisory Committee.

Table 1. Policy Categories and Maximum Scores

Maximum Score	Policy Category
20	Vehicle Purchase Incentives
20	Vehicle Adoption Standards
10	EVSE Installation Support
10	Non-Residential PEV Rates
10	Streamlined Permitting, Building Codes, Zoning and Ordinances
10	Transportation Sector Carbon Pricing
5	Education and Awareness Campaigns
5	HOV Lane Access, Parking Access, and Other Preferred Access Transportation Policies
4	Residential PEV Rates
3	Fleets
2	Dealership Programs
1	PEV and EVSE Planning
-2	PEV Fee Penalty

Note: The maximum scores sum to 100 without the -2 PEV Fee Penalty.

How to Use the Rubric

Estimating a score out of 100 for a jurisdiction entails three steps:

1. **Screen**: For each Policy Category shown in Table 1, assess whether your jurisdiction has policies at the local-, utility-, or state-level. Do not include federal policies.

2. **Score**: For each Policy Category, assess the strength of the policies on the spectrum using the scoring criteria provided. If no policy exists, a jurisdiction's score for that Policy Category is zero.

3. **Sum**: Sum scores across all Policy Categories to obtain a score out of a maximum of 100.

While the Rubric provides detailed instructions for scoring, there may be instances in which users of the Rubric must use their own discretion. In these cases, the user should choose point values that most closely align with the scoring criteria. Additionally, Appendix A provides answers to Frequently Asked Questions regarding scoring.

Figure 2 explains each element of the Rubric. Item 1 is the Policy Category name. Item 2 is a description of the Policy Category. Item 3 is a high-level description for how to score the category. Item 4 are the point adders, which are supplemental points if a jurisdiction's policy achieves a given design. Item 5 shows the criteria for assigning points in the Policy Category. The point values are in blue numbers.

VEHICLE PURCHASE INCENTIVES (20 POINTS MAXIMUM)

Policies that reduce upfront vehicle costs through direct rebates, tax credits, or sales tax exemptions. Use Rule #1 through Rule #3 to sum all non-federal vehicle incentives. Use Rule #4 to apply point adders.

Rule #1: If incentives exist at more than one level of government, sum the incentive values. If an incentive is restricted to a certain group of vehicle buyers, do not add it to the sum.

Rule #2: If one or more incentive is tiered (e.g., battery size), use the average incentive of all tiers

Rule #3: Identify the point value in the table to the right that is closest to the sum identified in Rule #1 and Rule #2.

Rule #4: Apply the adders in the table below, if applicable.

Incentive	Points	Incentive	Points
$1,000	2	$3,500	11
$1,500	4	$4,000	12
$2,000	6	$4,500	13
$2,500	8	$5,000	14
$3,000	10		

Point Adders

|	Points (Select All That Apply)
Equity Adder: If one or more incentive is tiered by income level or includes another equity criterion.	+2
Incentive Timing: 1. If the largest incentive value in the sum used in Rule #3 is a rebate or sales tax exemption that occurs at the time of vehicle purchase. 2. If the largest incentive value in the sum used in Rule #3 is a rebate that occurs after some delay (such as three months later).	+3 OR +2
Longevity of Incentive: If the largest incentive value in the sum used in Rule #3 is funded for two years or more.	+1

Figure 2. Elements Contained in Rubric Policy Category Pages

Evidence-Based Policies

There is growing recognition that policymakers can achieve substantially better outcomes by using rigorous evidence to inform decisions. Evidence-based policies enable governments to select, fund, and operate public programs more strategically. Despite a growing number of resources with "best practices" for PEV policy design, few resources provide a prioritized list of policies based on scientific evidence.

The types of methods for estimating policy impacts include randomized control trials, quasi-experiments, pre/post analysis without comparison groups, stated preference surveys, simulation, summary statistics, observational studies, focus groups, and case studies. Only randomized control trials and quasi-experiments provide *causal* evidence that a policy produces an outcome. Yet, both types of studies can be challenging, time-intensive, and expensive to implement. Thus, the vast majority of studies on PEV policy impacts fall into the bottom two groups of methods below. These do not demonstrate causality but still provide useful insights and are accepted alternative practices, especially when rooted in a strong theoretical foundation. Figure 3 conveys the hierarchy of scientific evidence.

Randomized Control Trials

Quasi-Experiments

Pre/Post Analysis without Comparison Groups

Stated Preference Surveys

Simulation

Summary Statistics

Observational Studies

Focus Groups/Interviews

Case Studies

Hierarchy of Evidence
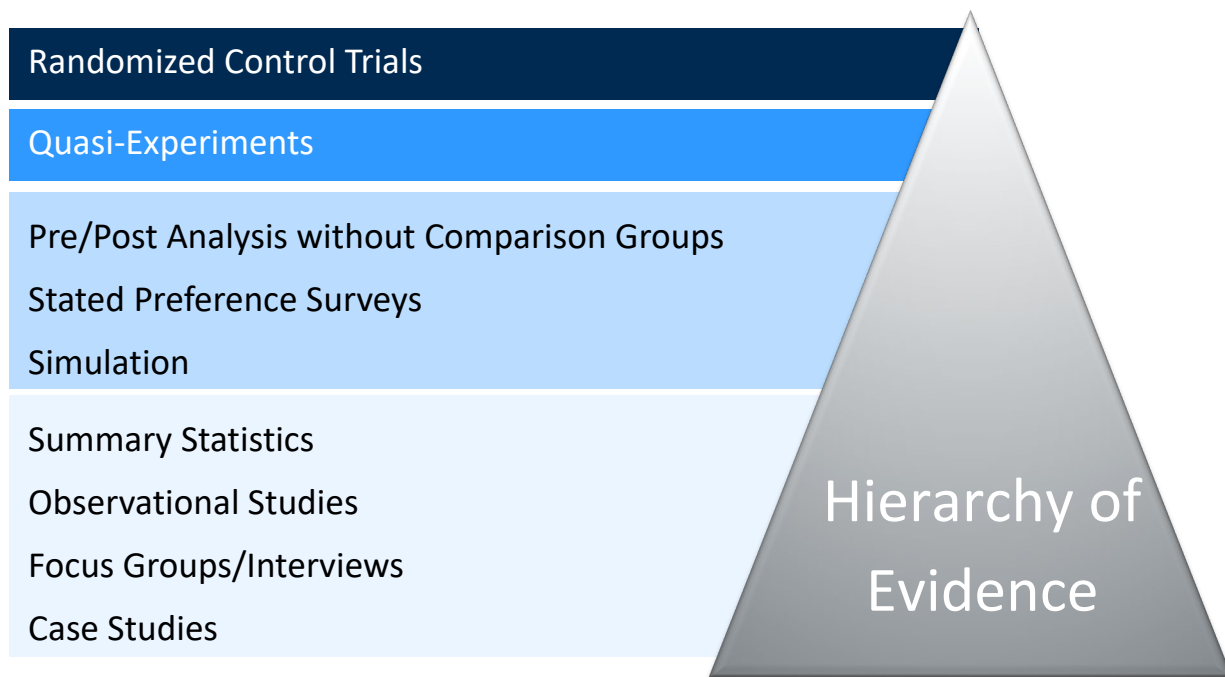
Figure 3. Hierarchy of Evidence from Scientific Literature

In-Depth Policy Review

Each page below is devoted to a single Policy Category and includes more detailed information than in the Rubric, including: (1) a discussion of the literature about the Policy Categories and (2) examples of how fictitious jurisdictions might be scored in a Policy Category. A list of Frequently Asked Questions is shown in Appendix A. Full citations are provided in Appendix B.

Vehicle Purchase Incentives

Max Points: 20

Description: Policies that reduce upfront vehicle costs through direct rebates, tax credits, or sales tax exemptions.

Evidence of Impact on PEV Adoption: Vehicle buyers place a strong emphasis on the upfront vehicle cost when making vehicle purchase decisions (National Academies of Sciences 2013). Incentives offered to vehicle buyers at the time of purchase have a greater impact on PEV adoption than the same amount offered later (such as three months later). Income tax credits are the least impactful vehicle purchase incentive design because they are both delayed and dependent on an individual's taxable income (Gallagher and Muehlegger 2011; Sierzchula et al. 2014). Incentives below $1,000 are ineffective at influencing vehicle purchase decisions (Jenn et al. 2018). Equity-related incentives have been shown to spur adoption of PEVs at a lower total cost to taxpayers (DeShazo et al. 2017; Jenn 2020). Policies that are stable and consistent over time are more effective at achieving desired outcomes than short-term or easily-overturned policies (NREL 2016).

How to Score: Use Rule #1 through Rule #3 below to sum all non-federal vehicle incentives (such as rebates and sales tax exemption). Use Rule #4 to apply point adders based on incentive design.

Incentive	Points
$1,000	2
$1,500	4
$2,000	6
$2,500	8
$3,000	10
$3,500	11
$4,000	12
$4,500	13
$5,000	14

- **Rule #1**: If incentives exist at more than one level of government (such as local and state), sum the incentive values. If an incentive is restricted to a certain group of vehicle buyers (e.g., low-income), do not include in the sum.
- **Rule #2**: If one or more incentive is tiered (such as by battery capacity), use the average incentive level of all the tiers (for example, if the incentive value ranges from $2,000 to $4,000, use $3,000 as the average).
- **Rule #3**: Identify the point value in the table to the right that is closest to the sum identified in Rule #1 and Rule #2 (for example, a total incentive of $2,100 rounds down to $2,000 for 6 points). The maximum number of points is 14.
- **Rule #4:** Apply the adders in the table below, if applicable.

Adder	Points
Equity Adder: If one or more incentive is tiered by income level or includes another equity criterion.	+2
Incentive Timing: 1. If the largest incentive value in the sum used in Rule #3 is a rebate or sales tax exemption that occurs at the time of vehicle purchase. 2. If the largest incentive value in the sum used in Rule #3 is a rebate that occurs after some delay (such as three months later).	+3 OR +2
Longevity of Incentive: If the largest incentive value in the sum used in Rule #3 is funded for two years or more.	+1

Scoring Example #1: City ABC is in a state with a $3,000 rebate at the time of vehicle sale, funded for the next three years. Additionally, the city offers a $1,800 mail-in rebate. Sum the incentives ($4,800) then find the closest corresponding value in the table (14 points). Because the larger incentive is a point-of-sale rebate (+3) offered for more than two years (+1), the city will add +3 and +1 points from the adder table, for a total score of 18 points.

Scoring Example #2: City XYZ is in a state with an after-purchase rebate of $1,000 for households that make above $100,000 per year and $3,000 for households that make below $100,000 per year. The program is funded for one year. The city will take the average incentive value ($2,000) then find the corresponding value in the table (6 points). The city will add +2 points for the Equity Adder, for a total score of 8 points.

Vehicle Adoption Standards

Max Points: 20

Description: Publicly stated vehicle adoption standards related to the total number or fraction of new PEV sales share. Examples include the Zero Emission Vehicle (ZEV) Standard and PEV sales targets.

Evidence of Impact on PEV Adoption: PEV adoption requirements send a long-term signal that a jurisdiction values increased PEV ownership. Binding requirements—like the ZEV Standard—provide policy certainty and potential market boost because automakers face penalties for non-compliance (Melton et al. 2017). For example, PEV market share is roughly twice as high in states with the ZEV Standard compared to states without the standard (CAP 2018). Likewise, at the city-level, cities in ZEV Standard states have higher PEV deployment than those in non-ZEV Standard states (Lutsey et al. 2015). Other non-binding PEV deployment targets lack accountability for compliance, and therefore send a weaker long-term signal to the market.

How to Score: Use the table below to identify point values associated with vehicle adoption standard.

Criteria	Points (Select only One)
Binding PEV sales requirements of less than 100% aimed at automakers, such as the ZEV Standard or feebates. Requirements include a financial penalty for non-compliance. Points only available if the policy is currently being enforced.	18
Same as above, but the policy is not currently being enforced.	14
Non-binding PEV deployment target aligned with reaching more than 50% PEV sales share by 2040.	2
100% Requirement Adder: Jurisdiction has binding requirement to reach 100% ZEV sales aimed at automakers that includes a financial penalty for non-compliance.	+2

Scoring Example #1: City ABC is in a state with the ZEV Standard being enforced through the year 2025. The city obtains 18 points.

Scoring Example #2: City XYZ is in a state that has adopted the ZEV Standard. However, the policy will not start being enforced for two more years. The city obtains 14 points.

Scoring Example #3: City DEF is in a state with a non-binding sales target of 100,000 PEVs by 2030 and 1,000,000 PEVs by 2040. This penetration aligns with a 75% sales target in 2040. The city obtains 2 points.

Scoring Example #4: City UVW is in a state with the ZEV Standard being enforced through the year 2025. The state is also enforcing a ZEV Standard to reach 100% ZEV sales by 2035. The city obtains 18 points plus the +2 100% Requirement Adder, for a total score of 20 points.

EVSE Installation Support

Max Points: 10

Description: Programs or policies that reduce the cost of or facilitate the installation of electric vehicle supply equipment (EVSE).

Evidence of Impact on PEV Adoption: Various research teams agree that higher numbers of EVSE directly correlate with greater PEV adoption (Hardman 2019). Sierzchula et al. (2014) examined the relationship between several policy and non-policy variables with 30 national PEV market shares for the year 2012 and estimated that an additional charger per 100,000 residents is correlated with a 13% increase in market share. Javid and Nejat (2017) conducted a regression analysis at the county level in 58 California counties and found a statistically significant correlation between public charging and PEV adoption, indicating that the link between charging availability and number of PEVs holds at smaller units of geography. Xie et al. (2018) concluded that inter-city fast charging infrastructure will be vital to alleviate range anxiety.

How to Score: Use the table below to identify point values associated with policy bundles that include public, workplace, residential, or multi-unit dwelling chargers; utility make-ready support; and grid modernization support.

Criteria	Number in List Achieved		
	At Least Two	At Least Four	At Least Five
1. Supports at least 80% of make-ready costs and equipment costs of direct current fast chargers (DCFCs). 2. Provides more than $5,000 financial incentive per public, workplace, or multi-unit dwelling Level 2 charging station plaza. 3. Provides more than $50,000 per DCFC charging pedestal. 4. Provides more than $1,000 financial incentive for single-family dwelling Level 2 charging station. 5. Program is easy to find on website or through other media. 6. Program has a long-term funding stream (such as earmarked revenue sources).	2	8	10

Scoring Example #1: City ABC is in a utility service area where the utility pays for up to 90% of the make-ready costs for charging stations. Additionally, the city offers a $2,000 financial incentive per Level 2 charging plaza. Information about both programs is easy to find on the website. Both programs have earmarked funding sources. The city achieves three criteria listed in the table (#1, #5, and #6) but does not meet the other criteria. Thus, the city receives 2 points.

Scoring Example #2: City XYZ offers several incentives: $8,000 per workplace charger incentive, $60,000 per DCFC charging pedestal incentive, and $1,500 per Level 2 charger in single-family dwellings. All incentives are easy to find on a central website. The program has earmarked funding. The city achieves five of table criteria (#2 through #6) and therefore receives 10 points.

Non-Residential PEV Rates

Max Points: 10

Description: PEV-specific or low-load factor rates for commercial and industrial sites.

Evidence of Impact on PEV Adoption: Among various types of EVSE, DCFCs are among the most difficult to economically justify. In addition to a much higher upfront cost than lower power chargers, demand charges (and other similar demand-based charges) substantially increase the costs of DCFC operation in some parts of the country. For example, in Denver, Colorado, demand charges may make up approximately 80% of the electrical bill incurred by these stations (Svitak et al. 2017). The Great Plains Institute (GPI 2019b) estimates that demand charges account for between 24% and 39% of total costs for a 50 kW DCFC station and between 68% and 81% of total costs for a 350 kW DCFC station. At the same time, consumers are willing to pay thousands of dollars to reduce charging time (Hidrue et al. 2011). In a tariff analysis, Rocky Mountain Institute shows that reducing or eliminating demand charges can promote a more conducive business environment for the public DCFC market (RMI 2017).

How to Score: Use the table below to identify point values associated with this Policy Category.

Criteria	Program Effect on Demand Charges for PEVs	
	Reduces	Eliminates
PEV-specific or low-load factor utility rates for commercial and industrial sites designed to reduce demand charges and other, similar demand-based charges. Program is easy to find and navigate on the website. Program has widespread eligibility and applicability.	5	10

Scoring Example #1: City ABC is in an electric utility service territory that has PEV-specific rates for commercial and industrial sites that mitigates demand charges. Because the utility does not fully eliminate demand charges, the city receives 5 points.

Scoring Example #2: City XYZ is in an electric utility service territory that has demand mitigation rates for fleet vehicles, but that does not cover public charging. The city receives 0 points because the rates do not meet the criterion of "widespread eligibility and applicability."

Streamlined Permitting, Building Codes, Zoning and Ordinances

Max Points: 10

Description: Policies, programs, codes, zoning and ordinances, statutes, and standard conditions that ease, encourage, or require EVSE installation.

Evidence of Impact on PEV Adoption: Streamlined permitting is important for reducing soft costs associated with EVSE installation, particularly for large, complex station plazas like DCFCs (RMI 2019). For example, in its *2019 Annual Report to the California Air Resources Board*, Electrify America found that delays associated with permitting stations in California resulted in 24% higher costs relative to other states with more streamlined permitting. Similarly, PEV-ready and PEV-capable building codes are critical for reducing the cost of future EVSE installation. Estimates show that EVSE installation costs increase by two (GPI 2019a) to six (CalETC 2019) times if a parking space is made PEV-ready after construction compared to during construction. Overall, this Policy Category reduces delays and soft costs related to EVSE installation. Greater numbers of EVSE is associated with greater PEV deployment (UC Davis 2018).

How to Score: Use the table below to identify point values associated with this Policy Category.

Criteria	Number in List Achieved		
	At Least Two	At Least Four	At Least Six
1. Zoning ordinances and codes establish PEV charging as a permissible use; do not classify PEV charging stations as conditional use or prohibited use. 2. EVSE permit approvals are fast-tracked relative to other permits. 3. A government website or checklist is easy to find and clearly describes permitting requirements and process. 4. Building code requires 20% or more of new parking spots to be PEV-ready with sufficient electrical capacity at 208/240 volt and 40 amperes per space with a dedicated brand circuit. 5. Building code requires some portion of new parking spots to be PEV-ready with sufficient electrical capacity. 6. Building code requires all new parking spaces to be EV-capable with a properly sized trunk line and subpanels. 7. Jurisdiction uses anti-internal combustion engine vehicle policies, signage, and enforcement to maximize the use of public chargers.	4	7	10

Scoring Example #1: City ABC has a zoning ordinance that establishes PEV charging as a permissible use. PEV permits are fast-tracked relative to other permits and the application and process are easy to find on the city website. Building codes require 40% of new construction to have PEV-ready electrical capacity and 100% to be PEV-capable. The city is aggressive in using fees to enforce vehicle turnover at stations and signs are well-placed and standardized. The city receives 10 points for achieving at least 6 of the 7 criteria (#1 through #4, #6, and #7).

Scoring Example #2: City XYZ requires 10% of new parking construction to be PEV-ready and the permitting process is well-marked on its website. The city receives 4 points for achieving two criteria (#3 and #5).

Transportation Sector Carbon Pricing

Max Points: 10

Description: Policies that shift consumer behavior through market-based, technology-neutral approaches, such as carbon tax, clean fuel standards, feebates, and other similar policies. These policies strengthen the investment environment and facilitate a funding mechanism.

Evidence of Impact on PEV Adoption: Carbon pricing works on two levels to incentivize PEV adoption. For fuel consumers, a carbon price improves the relative economics of electricity versus petroleum-based fuel at the fueling site, thereby incentivizing consumers to shift towards electricity as a fuel. This price signal is modest, since each dollar of carbon tax results in about a penny impact on gasoline price and also increases electricity price (Resources for the Future 2017). The larger impact of carbon pricing on PEV adoption occurs through fuel providers. In certain carbon pricing schemes – such as California's low carbon fuel standard (LCFS) – fuel providers generate revenue from selling fuel below a given carbon intensity threshold. For fuel providers who operate charging stations, this revenue translates to hundreds or even thousands of dollars per year, per station. For example, CALeVIP (2020) estimates that in 2021, a public Level 2 charger with 2.3 hours of charging per day generates $499 per year of LCFS credit revenue when credit prices are $150. On the high side, PG&E (2020) show that a charging station for a Class 8 electric truck driven 60,000 miles per year generates $33,900 in LCFS credit revenue using average 2019 credit values. Overall, studies demonstrate that electricity sales have risen substantially under programs like the LCFS (Witcover 2018) and that these carbon pricing schemes are an important element in boosting the PEV market (UCS 2018).

How to Score: Use the table below to identify point values associated with policy bundles for carbon pricing policies.

Criteria	Achieves One	Achieves Both
1. Long-term (10 years or more) binding transportation policy that incentivizes PEV adoption through a carbon pricing scheme, such as a carbon tax, cap-and-trade, low carbon fuel standard, or feebate system. 2. Policy generates revenue for PEV owners or EVSE operators, such as a low carbon fuel policy to reduce carbon intensity by 10% to 15% over 10 years.	5	10

Scoring Example #1: City ABC is in a state with a 10-year low carbon fuel standard that generates revenue for charging station owners. The city receives full credit for both criteria, for a total of 10 points.

Scoring Example #2: City XYZ is in a state that is part of a regional collaboration that prices transportation emissions using a cap-and-trade system. The policy generates revenue through the auction of allowances. The city receives full credit for both criteria, for a total of 10 points.

Education and Awareness Campaigns

Max Points: 5

Description: Campaigns aimed at increasing PEV education and awareness of vehicle buyers, dealerships, and other PEV stakeholders.

Evidence of Impact on PEV Adoption: Awareness of PEVs is low among the car-buying public but differs by location. In one major multi-state survey of new car-buying households across the U.S., the fraction of respondents in a given state who had reported seeing PEVs on the road ranged from as low as 25% to as high as 72% (UC Davis ITS 2014a). The car-buying public also has a low level of knowledge about PEV incentives (NAS 2015). Ride and drive events are cited as important for helping the car-buying public to gain direct experience with the PEV technology. The Center for Sustainable Energy (2017) summarizes results from an outreach campaign designed to influence the attitudes of San Francisco Bay Area residents toward EVs through free PEV test-drive events. The report indicates that 11% of survey respondents either purchased or leased a PEV within a few months of their test drive.

How to Score: Use the table below to identify point values associated with policies aimed at education and awareness of PEV technology and incentives, such as ride-and-drive events, PEV Awareness Month participation, dealership training, and public advertisements.

Criteria	Number in List Achieved	
	At Least One	All Three
The jurisdiction has government or utility policies/programs that: 1. Support a large-sized promotional campaign, such as education, social media, outreach, or workplace charging programs. 2. Provide medium- to long-term funding to support the policy/program (more than one year). 3. Have one or more campaigns aimed at raising education and awareness among low- and moderate-income households.	2	5

Scoring Example #1: City ABC is in a state that runs a three-year PEV awareness campaign focused on educating frontline communities about the benefits and incentives of PEV technology. The city achieves all criteria and therefore receives 5 points.

Scoring Example #2: City XYZ participates in National Drive Electric Week and hosts three ride-and-drive events through the year. The program is funded year-to-year. The city meets only one of the three criteria (#1) and therefore only receives 2 points.

HOV Lane Access, Parking Access, and Other Preferred Access Transportation Policies

Max Points: 5

Description: Policies that ease travel and parking for PEV drivers relative to drivers of conventional vehicles.

Evidence of Impact on PEV Adoption: A reduction in the cost or inconvenience of travel relative to internal combustion engine vehicles acts as an incentive toward PEV ownership. However, the various papers that quantify this impact demonstrate a wide range of findings, from extremely large to negligible. The emerging consensus is that preferred access policies are context-specific: effectiveness is driven by the cost of travel at a local level (Hardman, 2019). For parking, many studies in Europe show that free parking is a statistically significant predictor of PEV adoption (for example, see Bjerkan et al. 2016 and Aasness and Odeck 2015). Travelers in areas with limited parking supply or high parking tariffs can gain much from being allowed to park for free or to park in designated parking places. Other research shows that free parking is attractive for some consumers, though financial incentives and freeway charging stations are more effective in promoting PEV adoption (Lieven 2015). Other research shows that gaining access to restricted lanes (such as high occupancy vehicle (HOV) or bus lanes) and reduction in tolls are important incentives for PEVs (Langbroek et al. 2016 and Bjerkan et al. 2016).

How to Score: Location-specific policies depend on local conditions and are more feasible in some metro areas. Score these policies by examining how aggressively the jurisdiction is implementing the full set of possible policies given its local context.

Criteria	Number of Feasible Policies Achieved	
	Some	All
1. HOV lanes: Access to HOV lanes for PEVs. 2. Parking: Free or preferred parking for PEVs. 3. Tolls: Fee waivers for PEVs on tolls. 4. Ferries: Fee waivers for PEVs on ferries. 5. Other preferred access transportation policies: For example, green zones and geofencing that restrict access for internal combustion engine vehicles.	2	5

Scoring Example #1: City ABC does not have HOV lanes on its highways, nor does it have ferries. However, the city provides widespread preferential parking for PEVs and discounted tolls for PEVs. The city receives 5 points for *aggressively pursuing* all feasible location-specific policies listed in the table.

Scoring Example #2: City XYZ provides preferential HOV lane access to PEVs. Even though it could, the city does not provide free or preferential parking for PEVs and therefore receives 2 points for pursuing a sub-set of feasible location-specific policies listed in the table.

Residential PEV Rates

Max Points: 4

Description: PEV-specific rates for households, smart chargers, or both.

Evidence of Impact on PEV Adoption: Operational cost is a key variable explored in several papers using choice experiments, in which survey respondents are given a list of vehicle attributes and costs and told to choose the vehicle that best suits their preferences. Differences in operational costs impact vehicle choice (Lioa et al. 2017). For example, Kara et al. (2015) show that a smart meter can reduce a battery electric vehicle household's electric bill by approximately 25% per month. A further consideration is that one dollar of operational savings is not valued the same as one dollar or upfront savings. NAS (2015) find that the calculations needed to estimate the payback of PEVs relative to a gasoline equivalent vehicle are "complex enough to be overwhelming for a typical mainstream consumer …" (p. 65).

How to Score: Use the table below to identify point values associated with the list of policy elements.

Criteria	Number in List Achieved	
	Exactly Three	Four or More
1. PEV-specific charging rates or favorable time-of-use rates or incentives for PEV charging. 2. Program is easy to find and navigate on the website. 3. Widespread eligibility of program (offered by all utilities serving the metro region and to all residential customers). 4. Smart meter program in support of PEV charging. 5. Program designed to encourage low- and moderate-income households.	2	4

Scoring Example #1: The utility in City ABC offers PEV-specific residential charging rates. The program is easy to find on the utility website and is available to all utility customers. The utility also provides discounts for low- and moderate-income households. The city fulfills four criteria (#1, #2, #3, and #5) so receives 4 points.

Scoring Example #2: The utility in City XYZ is piloting a time-of-use rate aimed specifically at the subset of PEV owners in private homes in the service territory. The program is easy to find and navigate on the website. Additionally, the utility offers a free smart meter to support PEV charging. The city fulfills three criteria (#1, #2, and #4) so receives 2 points.

Fleets

Max Points: 3

Description: Government or commercial fleet electrification programs or policies requiring the adoption of PEVs.

Evidence of Impact on PEV Adoption: Past research establishes a strong connection between increases in the visibility of a product and demand for that product. When applied to new vehicles, Pettifor et al. (2017) characterize this as the "Neighborhood Effect"—the reduction in perceived "technological and social uncertainties" that occurs when information is "gained from observing vehicles being demonstrated by others in close physical proximity." This uncertainty is a major barrier to PEV adoption, so it logically follows that a reduction in this barrier will lead to greater PEV market uptake. Many government organizations have PEV purchase requirements. However, moving forward, there may be regulation of private fleets such as taxis, Lyft, and Uber (Ohnsman 2018). These regulations, as currently proposed, would require additional PEVs on the road, further raising awareness among the community. Furthermore, since private fleets are much larger than government fleets (Lyft and Uber have 200,000 drivers in California alone), the impact of their electrification would not only be valuable from a visibility standpoint but could also have a significant impact on PEV adoption overall.

How to Score: Use the table below to identify point values associated with this Policy Category.

Criteria	At least 10% of vehicle stock are PEV	30% of vehicle stock are PEVs
Requirement on procuring PEVs within the entire jurisdiction-owned fleets over the next 10 years.	1	2
Commercial Fleet Adder: Jurisdiction has binding requirement to electrify commercial fleets (such as transportation network companies)	+1	

Scoring Example #1: City ABC has a requirement that 50% of all city-owned vehicles are PEVs by 2025. The city receives 2 points.

Scoring Example #2: City XYZ has a requirement that 25% of city-owned vehicles are PEVs by 2030. The city receives 1 point.

Scoring Example #3: City DEF has a requirement that 25% of city-owned *sedans* are PEVs by 2030. Because sedans only account for 20% of all city-owned vehicles in City DEF, the effective requirement is that 5% (25% x 20%) of city-owned vehicles are PEVs. Thus, the city receives 0 points.

Scoring Example #4: City UVW has a requirement to procure two PEVs every year for the next 10 years. The city-owned fleet has 200 vehicles. Therefore, the cumulative number of PEVs procured after 10 years will be 20, or 10% of the fleet. The city receives 1 point.

Scoring Example #5: City GHI has a policy that requires transportation network companies and taxi operators to transition to greater fractions of PEVs within the next five years. The city receives 1 point based on the Commercial Fleet Adder.

Dealership Programs

Max Points: 2

Description: Programs and policies that either (1) incentivize automotive dealerships to sell PEVs or (2) allow automakers to directly sell PEVs to buyers.

Evidence of Impact on PEV Adoption: Dealerships have a significant effect on how customers perceive PEVs. A series of interviews in California suggests that the pre-existing retail structure of automotive dealerships could spur retail innovations for PEVs but could also hinder the quality of customer support and pace of diffusion among dealerships and customers (UC Davis ITS 2014b). In another set of interviews in Europe, de Reubens et al. (2018) found that dealers were dismissive of PEVs, misinformed shoppers about vehicle specifications, omitted PEVs from the sales conversation, and strongly oriented customers toward non-PEV alternatives. The study concluded that policy and business strategies that address barriers at the point of sale are needed to accelerate PEV adoption.

How to Score: Use the table below to identify point values associated with this Policy Category.

Criteria	Number in List Achieved	
	One	Both
1. Incentive for dealerships of at least $500 per PEV sale. 2. Policy that allows automakers to sell PEVs directly to buyers.	1	2

Scoring Example #1: City ABC offers auto dealerships a $500 sales incentive for each PEV sold. The state government authorizes the direct sales of vehicles to customers. The city receives 2 points.

Scoring Example #2: City XYZ provides a $300 incentive to salespersons at dealerships for selling battery electric vehicles and $200 for selling PEVs. The city receives 0 points because the values are under the $500 criterion.

PEV and EVSE Planning

Max Points: 1

Description: PEV planning, strategy development, and collaboration activities organized by the government or utility.

Evidence of Impact on PEV Adoption: A few research papers examine how PEV and EVSE planning activities impact PEV adoption. In their statistical state-level analysis of PEV policies, Vergis and Chen (2015) used the variable "Community Readiness Funding" levels awarded in 2011 by the U.S. Department of Energy to capture community readiness plans. The authors used a stepwise regression and determined that this variable did not improve the fit of the model (and therefore excluded it from the model). UC Davis ITS (2014b) highlight the importance of dealer inclusion in PEV planning and advocacy.

How to Score: Use the table below to identify point values associated with this Policy Category.

Criteria	Achieves Both Items
1. PEV readiness plan or similar planning document published in the prior five years for city or state. 2. Has active partnerships and collaborations on advancing PEV adoption, such as state-led coalitions, Clean Cities Coalitions, dealerships, nonprofit coalitions, car clubs, or advocacy groups.	1

Scoring Example #1: City ABC published a PEV charging strategy document within the last five years and actively collaborates with its Clean Cities Coalition, PEV car club, and the local environmental organization. The city receives 1 point.

Scoring Example #2: City XYZ has a PEV readiness plan from 2012 that it plans to update next year. The city staff regularly collaborate with its Clean City Coalition, PEV car club, and the local environmental organization. The city receives 0 points because it has not written a PEV readiness plan within the past five years.

PEV Fee Penalty

Max Points: -2

Description: Annual fees on PEVs.

Evidence of Impact on PEV Adoption: Thirty states have PEV road usage fees, ranging from $19 to $200 per year (EDTA 2020). Drivers of internal combustion engine vehicles pay, on average, just under $100 per year in state gasoline taxes (PIA 2020). Jenn (2018) finds that a road usage fee imposed on PEVs detracts from the market adoption of PEVs and results in 10% to 20% decrease in new PEV sales in the short-run.

How to Score: Use the table below to identify point values associated with this Policy Category.

	Less than $100 per year	Equal to or more than $100 per year
PEV annual fee value	-1	-2

Scoring Example #1: City ABC has an annual PEV fee of $130 per PEV. The city receives a -2 point penalty.

Scoring Example #2: City XYZ has an annual PEV fee of $80 per PEV. The city receives a -1 point penalty.

Appendix A. Frequently Asked Questions

How do I calculate a score?
Evaluate each individual Policy Category. Once you have completed scoring for each category, sum all the point values. The maximum point value is 100.

Should I include federal PEV policies when scoring?
No, when scoring the policies only include sub-national policies (such as those at the local, state, utility, and multi-state levels).

What is considered a "good" score?
Leading jurisdictions in the United States have scores of between 70 and 80.

What should I do if the scoring criteria does not perfectly align with my policies?
While the Rubric provides details about how to score Policy Categories, you may need to use discretion when scoring. In these instances, choose point values that most closely align with the scoring criteria.

What if I have a policy that is clearly missing from this Rubric?
PEV policy design are diverse and constantly evolving. If your jurisdiction has a PEV policy that does not fit well within one of the Policy Categories, we will do our best to incorporate an appropriate Policy Category in future versions of this Rubric. Please send an email to Geoff Morrison at Geoffrey.Morrison@CadmusGroup.com and Cassie Powers at CPowers@Naseo.org.

How should I score a metro area located in multiple states?
Score the jurisdiction in each individual state, then weight the scores by the current PEV population in each jurisdiction. For example, the Washington DC metro area spans Virginia, Maryland, and the District of Columbia. In this case, the user should score the jurisdictions in each state separately and then calculate an average weighted score based on PEV population.

How should I score a metro area with multiple utilities?
We recommend scoring the policies of the largest utility (by number of residents) in the metro area. If two or more utilities have roughly the same size service territory, use a weighted average of the scores across different utilities, where the weight is the approximate share of customers served.

What if an incentive is limited to a sub-set of technologies (e.g., a rebate only on Nissan LEAFs)?
Incentives that focus on a single technology or manufacturer do not receive points.

How should I score a metro area with several municipal governments?
If one municipality has a large fraction of the population (such as more than 75%), only score the policies within that municipality. If two or more municipalities account for a sizable fraction of the metro area's population, score each municipality and use a weighted average of the scores (based on population share).

What if an adjacent jurisdiction has a policy that "leaks" over to my jurisdiction?
In some cases, metro areas are very close to other metro areas that have impacts on PEV adoption, such as when a large share of commuters receives special HOV lane access in an adjacent jurisdiction. To maintain consistency in scoring, only score policies within one jurisdiction. Do not score policies in adjacent jurisdictions even if they have a leakage effect on PEV adoption.

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